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DOES MASS PRODUCTION TEND TO MINIMIZE PROFITS?

By WILLIAM WREN HAY

THE uneconomic expansion of mass production, involving as it has, during the past decade, a continuing increase of manufacturing capacity, is now proving detrimental to profits. For many acute managers are discovering that the law of diminishing returns is still in operation.

Increase of fixed capital, beyond justifiable limits, in order to expedite the turnover of working capital, is one of the factors following in the train of mass production practice which is presenting a serious problem to management.

Style and model changes which are based upon a desire to stimulate consumption, rather than to improve the serviceability of the product, are also economically unsound, in the opinion of the author of this article.

ALL industries are to a considerable extent subject to the long-time operations of economic laws. What an industry can do in spite of changing economic conditions can be fairly appraised only from the financial results obtained over a period of years. Measured by past profits, industries which adopted mass production methods, such as automatic and continuous production, were most successful. However, there were many signs of changing influences on manufacturing industries supplying consumers' articles of necessity or utility, but the failure of demand has found almost all these producers unprepared. Mass producers depended too much on markets which were exhibiting all the signs of stabilization. As a stimulant to keep sales (production) continuous, various appeals to buyers were resorted to, including easy credit, style, and now price. It seems apparent now that the benefits secured from mass production are diminishing because many markets can no longer absorb the output continuously.

The financial reports of many industrial corporations contain sufficient evidence of the consequences that follow when mass producers depend too much on limited, or stabilized, markets. Also, enough reports supply exceptions to justify the belief that regular and growing profits may be secured in the same markets. Steady growth in earnings is much preferred to abnormal profits followed by losses. Just now, many large and small corporations have fallen back to an output no greater than they produced several years ago, and at the same time their profits have reached a vanishing point or are already "red." The expense of carrying excessive investments goes on whether the plants are producing or shut down. The truth of the matter is many acute managers are discovering that the old law of diminishing returns is now operating against further great increases in earnings secured from plant expansion. Management must realize now the relative urgency of more output compared with more value, and the relative advantage of lower prices from volume compared with decreased cost from operating efficiencies.

Temporary disturbances like the present affect management in very different ways from the ordinary fluctuations of business. The uneconomic expansion of mass production methods in recent years now proves devastating to the profits and to the future prospects of many wealthy corporations. The rapid increase in continuous and automatic plants has been halted because capacity to produce is now much in excess of the consuming capacity of the country. As an industry tends to stabilize, even temporarily, demand becomes irregular and tends to fluctuate with good and bad business conditions. The problem of volume producers then becomes one of adjusting plant and methods to high and low production, in order to maintain a balance between fluctuating consumption and continuous production. This requires some degree of continuous demand for some years in advance.

Our enforced curtailment of production was due to the persistent pressure of economic conditions on an industrial world which refused to submit. A long period of time is required to get the full operations of all the causes which affect industry, but the results are no less sure. Industry had come to place a growing reliance on low costs secured from high volume and labor costs lowered at the expense of overhead costs. Just now there is a serious maladjustment between invested capital and production. In other words, the substitution of certain economies has not compensated for the loss of others. More than one manufacturer is now paying out former profits in overhead costs on automatic or continuous equipment for mass production. These investments were made in order to secure low costs from high volume.

It is an immutable law of economics that the benefits which result from increased expenditure in any given direction would be relatively large up to a certain point, and would then gradually diminish. The relative advantages of mass production were most profitable in industries which were growing rapidly and in which consumption was continuously increasing. The first definite interruption of demand became the limit beyond which any further investment would not compensate for the outlay. Then, too, there was considerable mistaken appraisal of the demand, style was resorted to, competition became severe, and the economic law of substitution ("The fight for the consumer's dollar") was operating. Curtailment was inevitable, but was ignored by too many, and expenditures made to increase production went on.

Model Changes Temporary in Effects

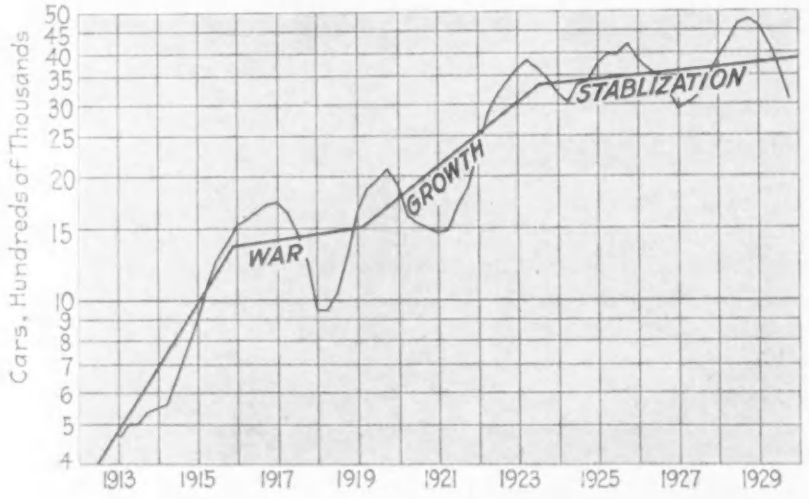
Some of the experiences of recent months lead to the conclusion that the manufacturer who depends on volume alone as a source of profits cannot safely build his business on the intangibles that make up style and other fads. Regular and fair profits, when secured by the manufacturer of articles of utility, depend on quality at a sufficiently low price to attract buyers at all times, good and bad.

The development of hand-to-mouth buying placed burdens on the manufacturer that were not contemplated when mass production methods were applied to manufactured articles. The volume producers, up to a few years ago, depended on continuous and increasing production to lower costs and a recession of orders seriously interrupted their plans.

They failed to observe the operations of economic laws on their markets. An industry becomes stabilized when further consumption depends upon replacement, population growth and temporary business conditions. When this stage was entered and large production depended more upon prosperous business conditions, a mere lowering of prices was not sufficient to maintain demand; and style changes of models were resorted to in an attempt to influence consumers. This new appeal was so successful at the outset that it was accepted as essential to industry and many mass producers lost their perspective and devoted their energies to manufacturing "models."

Style Changes Do Not Benefit the Purchaser

Style is only temporary in its effects and in the long run confers no benefit on the buyer, who may soon find himself in possession of "last year's model." The very conditions of an industry which enable a manufacturer to attain momentary success from me-



THREE periods are discernible in the chart, which shows the annual production progress of our largest mass production industry. Development, expansion and stabilization periods appear in succession. The chart shows the annual dollar wholesale value of passenger cars produced in the United States.

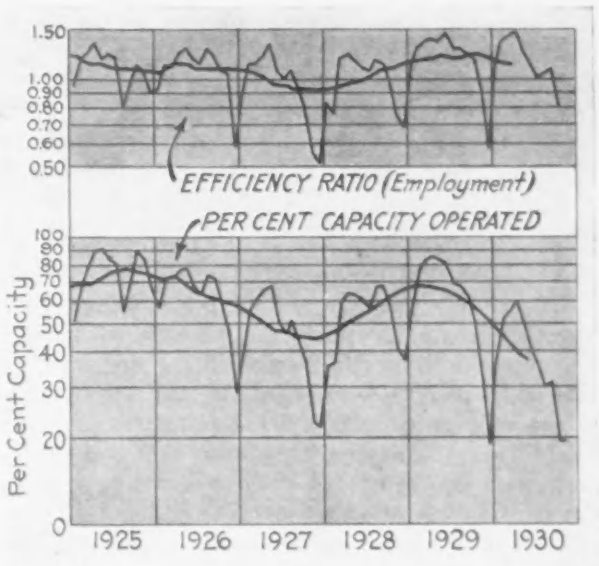
chanical fads, or from fashion, render that firm liable to be supplanted quickly. The article may be as useful and as good as any of its kind, but style may be appropriated or adapted by competitors to attract the public eye with yet newer fashions. Nothing draws competition as readily as style.

The manufacturer makes a fundamental mistake when he attempts to create dissatisfaction with earlier models by putting out "new models." There is no need of changing models when the design is correct. If the public is encouraged to expect new models from year to year, there comes a time when the steady flow of orders will cease, continuous production is broken, and profits fall. Instead, a reputation for standardized quality might have been achieved by adding refinements and improving the quality to give the greatest value at the price. At the same time, the good will of previous buyers, who had been protected on their investment, would have been secured and continuous production might have been maintained in the face of receding price levels.

The policy of periodical changes of models is contrary to the economies arising out of volume production, it is temporary in its effects, and has reached a stage where no further progress may be made. Not only have such changes been extremely costly to individual producers, but the periodical liquidation of former models has proved injurious to the trade generally. The manufacturing plant must often be shut down for new tooling; sales dry up at the mere rumor of changes, and the dealer organization is burdened with unsalable inventories. In addition to the manufacturing expense connected with the changes, potential profits are lost and expenses become higher when production ceases, and the producer who would hold his selling organization is finally forced to make rebates and allowances on merchandise rendered obsolete by the new models.

Value of Annual Model Changes Is Now Questioned

The passenger automobile industry now frankly doubts the practice of stimulating sales by changing models. Various reasons are advanced for this change, but the fundamental reason is that during 1930 the industry was forced to the conclusion that it requires more than fashions to maintain continuous large-scale production. There is more than

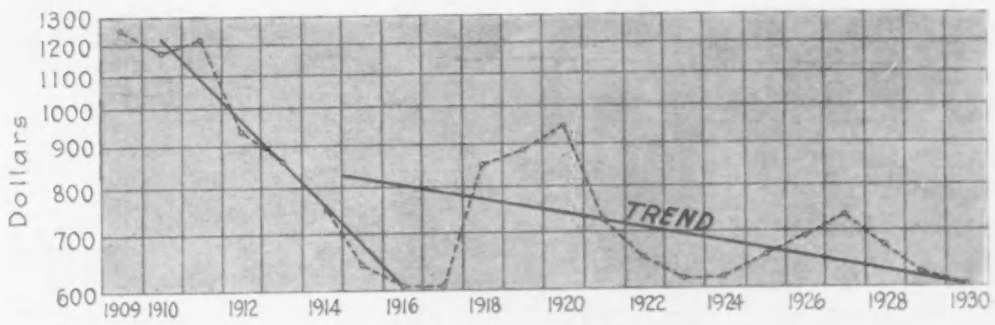


THIS chart shows the comparison of capacity operations with manufacturing (labor) efficiency in the automobile industry. The latter has not been decreased, in spite of the recent falling off in automobile output. This is because of the improved flexibility of control secured by efficient management.

this to be considered, however. Even the recent decision of the industry for a uniform date on which all yearly models would be announced is not enough. It is very doubtful whether the desired result may be secured. The practical result will be to concentrate buying in fewer months and this will disturb continuous production again. A few years ago, the rapid increase in sales of closed cars had the opposite and beneficial effect of spreading buying out over the whole year and probably lowered the peak for which plant facilities (capacity) must be provided.

The return to first principles of volume production must, of necessity, eliminate dependence on model changes as a means for creating demand. What are the underlying reasons for successful volume production of manufactured articles of utility?

The experience of successful volume producers has been that design (and by this we do not intend to



THE persistent operation of the law of diminishing returns is illustrated in the price trends in the automobile industry. In this chart, which shows the fluctuations and trends of average yearly wholesale prices for passenger cars, it will be seen that the price tends to approach the cost of production.

exclude appearance) is fully as effective in competition as price, for a large proportion of buyers are always influenced more by value than by price appeal. And those manufacturers who have paid more attention to the refinement and performance of their articles have fared fully as well in their volume and better in respect to their profits than have others who depended solely on low prices and new models to get continuous production.

Improved Design Adds Product Value

To sell continuously and in the large quantities essential to volume production, a product must be kept up-to-date in its fundamentals and must be constantly increased in value to the buyer. This cannot be done by merely changing models or by cutting prices. A market resistance that reduces the continuous flow of orders, such as a change of model, will defeat mass production, which is dependent upon continuous and increasing volume for its economies and profits.

Mass production is quantity production by continuous methods of manufacturing and is most effective when fully integrated.* The object is to produce articles at a sufficiently low cost to maintain demand and yield continuous profits. The problems of the manufacturer committed to mass production are many, but the foundation of success lies in good design, and this in turn is the basis for all other policies.

It is essential that the articles manufactured are designed with the largest number of standard or similar parts which are interchangeable thoughout the range of models to be marketed—parts which are rarely changed.

A change of models is likely to place a larger burden on the retail dealer by forcing him to carry a stock of repair parts that are obsolete. When such parts are no longer in regular production, the manufacturer must go to considerable additional expense to maintain the supply of such obsolete parts. The article must, of course, be technically sound, the materials carefully selected, and machine limits chosen to conform to its use and to production methods. The parts must be standardized within the use and life of the article. The design of the integral parts of an assembled article must be just as sound and as fully integrated as the whole. A great many present-day electric appliances and other similar articles owe their large volume production to the design and assembly of fractional horsepower electric motors. These motors are now made to suit a wide range of voltages and in varying capacities. The usual design permits wide flexibility both as to size and number that may be made continuously. The price has been lowered to "cost of production" and the use has been and continues to be increased.

Six Years the Ideal Term of Use for Largest Market

For true economy an article that is to last, in use, about six years, and is the best article of its kind in a predetermined price class, will bring it within the reach of the largest number of initial buyers. Only such changes of design or quality should be made as will improve the article and maintain the flow of orders. In other words, the aim should be to produce in accordance with existing needs of the article and then design to give such value as will create a continuous demand.

If the market is big enough to warrant large-scale production, modern methods of mass distribution can soon satisfy the initial buyers and the economies of large-scale production become more important as marketing becomes more difficult. It is a waste of time and money slowly and expensively to build up a market with articles which will not wear out under ordinary use. A well designed article should be progressively improved and refined because, as demand stabilizes, the initial or replacement buyers may become increasingly important to the producer.

The manufacturer should then seek only a share of the existent market that may be profitably secured, depending upon the high quality of a standardized article to sustain a demand which will maintain his position. Ordinarily a permanent position in a market may only be slowly and expensively acquired and, while others might achieve more than their share by large-scale production, it requires an exceptional individual to capture more than a certain share of the total market and hold it to his profit. Expansion into stabilizing markets can only go so far before competitors interpose restrictions, for naturally the success of any manufacturer cuts into the sales of firms already established.

The very conditions which enable a producer to attain a market by intangibles of style render that firm liable to be supplanted by other firms offering yet newer appeals to the buyer. The alert manufacturer and the so-called marginal producer are more likely to adapt ideas from a successful competitor than to depend upon their own resources and skill. Slight difference in price or appearance or style are not sufficient to hold a market, for the buyer will then look for value.

In many industries in which the economies of mass production have been most profitable some one or two producers have outstripped competitors and have secured a large share of the whole available market. To these volume producers large-scale production becomes of first rate importance. As the industry develops stability of demand, these firms find marketing more difficult, and, when continuous production breaks down, their costs rise and many lose their profits for a time.

Fluctuating Demand Increases Difficulty of Mass Production

It is difficult to advance any solution to the real problem of profitable mass production under conditions of fluctuating demand. Profits are the index of efficiency and enterprise of management. And the fact that production cannot profitably be increased much faster than consumption may not have been overlooked by individual managers. Notwithstanding the high class of management that characterizes our

(*Concluded on page* 682)

*Integrated: "Composed of several parts which together make a unity."

†". . . We may divide the economies arising from an increase in the scale of production . . . into two classes—firstly, those dependent on the general development of the industry; and secondly, those dependent on the resources of the individual . . . business engaged in it. . . ."—Marshall, "Principles of Economics," Vol. I.

Measurement of Rolling Mill Pressures

By W. L. DE LANEY

SEVERAL methods have been used in measurements of pressures between the rolls in both hot rolling and cold rolling of metal. One of the favored methods has been the use of a form of plug gage inserted between the upper roll neck and the screwdown. Details of the construction of such a gage, and of the instruments through the use of which its operation can be visualized, are given here. This method has the advantage that it can be used to record not only regular operating conditions, but also the unusual features occasioned by cobbles or other special conditions in a mill. Some of the graphs shown indicate also the actual length of time the steel is subjected to pressure between the rolls.

IN machine design it is usually difficult to evaluate all the factors which have to be taken into consideration. This is especially true in designing such equipment as rolling mills and cold-rolling strip mills.

Tests for determining the power input required for a mill for a given reduction may be made by recording electrical instruments, but of equal interest to the designer are the stresses to which the housing and other parts are subjected by the pass. These stresses are of a transient nature and, while theoretical computations may be made, based on certain assumptions, it is desirable to have a check on these to aid the designer.

Measurement of transient stresses and means of determining their value has been one of the logical results in the development of the McCollum-Peters electric telemeter. This instrument was developed at the United States Bureau of Standards and was first described in 1923. The essential part of the apparatus consists of small carbon resistors, mounted in a metal frame in such a way that their resistance is changed by the pressure resulting from the elastic deformation of the frame, which is acted upon by the external force or strain to be measured.

The change in resistance is utilized in a Wheatstone bridge circuit either to indicate or to record the effect. In place of the galvanometer element of the standard bridge circuit a milliammeter may be substituted, for visual readings, or a recording potentiometer or oscillograph may be substituted, when it

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PRESSURE plug for use between roll neck and screwdown. At right the plug is completely assembled. At left the casing has been removed, to show the telemeter mounting.

▼ ▼ ▼

is desired to make permanent records.

The type of telemeter used for measuring roll pressures is the two-resistor type, which has the advantage of having a straight-line characteristic and is largely compensated for temperature effects. It is made evident, by studying the circuit characteristics, that the sensitivity may be changed by changing the voltage on the bridge.

In applying the telemeter to determining rolling mill pressures, a pressure plug is used. It consists of a cylinder of steel about 6 in. high and from 5 to 12 in. in diameter, according to capacity. On the surface and parallel to the axis of the cylinder are mounted three telemeter gages at 120-deg. intervals. The plugs are designed to utilize only their central portion, to eliminate the so-called end effects (unequal stress distribution). The three telemeters may be connected in series, to determine the average value, or may be connected to separate bridge circuits and individual records made.

Each plug with telemeters is inclosed by a ring and a suitable terminal board, mounted as shown in one photograph.

In practice, the plugs are inserted in the mill in place of the regular breaker and show no more deflection than an equal length of screw. They may be left in place indefinitely without damage, but it is not recommended, as they are intended primarily for test purposes. The ease of installing and removing are one of their chief recommendations.

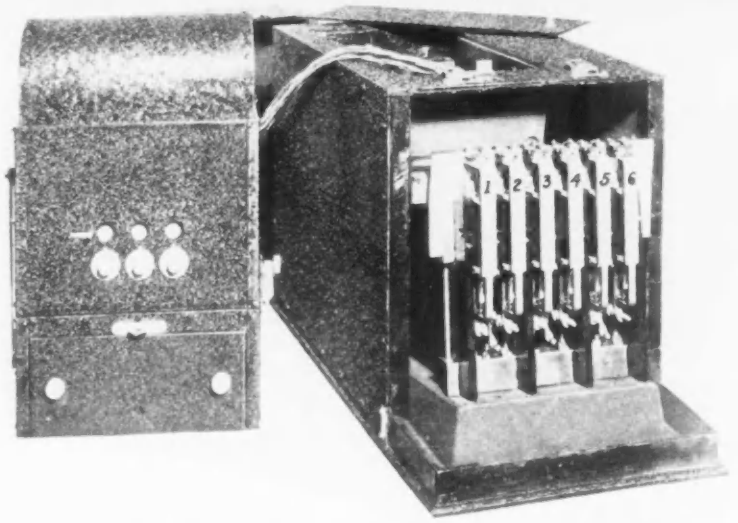
All plugs are calibrated in a compression testing machine, with the apparatus set up in the regular manner. Typical calibration curves show practically straight lines.

By connecting the oscillograph in the circuit, the value of the deflection, also, may be made at the same time.

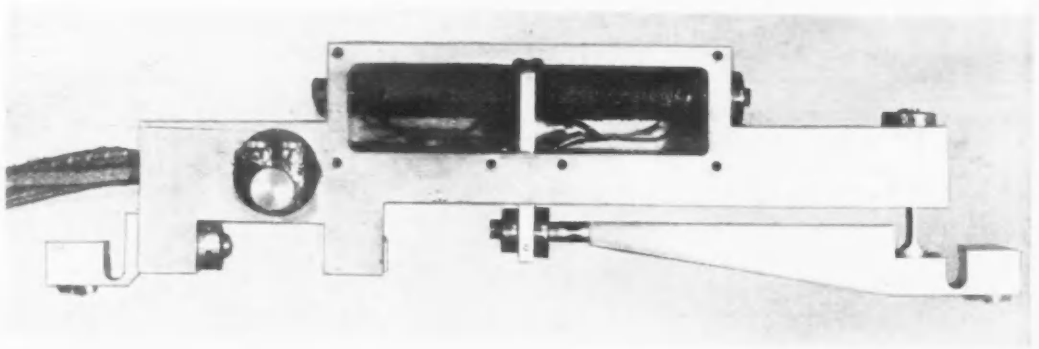
Plugs have been made up to 2,000,000-lb. capacity. The capacity limit is determined only by the space available for installation. It is, of course, recommended that frequent checking of the calibration be made, to insure accuracy.

Oscillograms of pressure are shown, taken on a cold-rolling strip mill, and also on a three-high mill, with the plug loaded eccentrically.

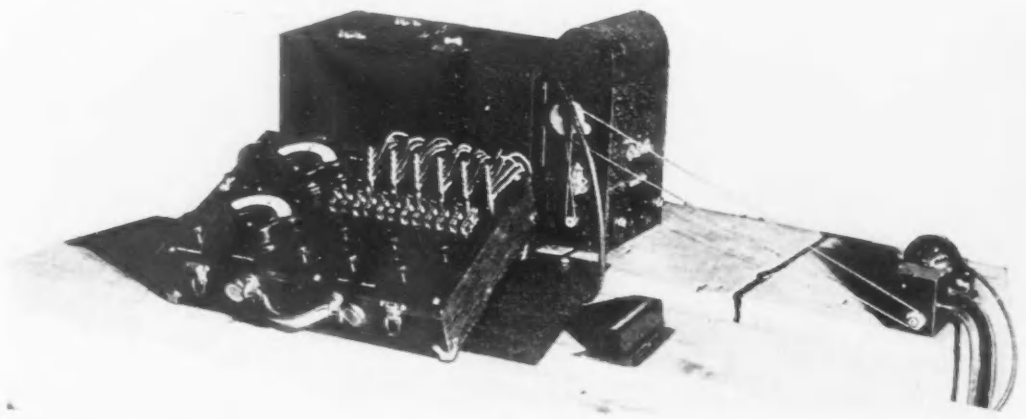
From these not only are the load on the housing



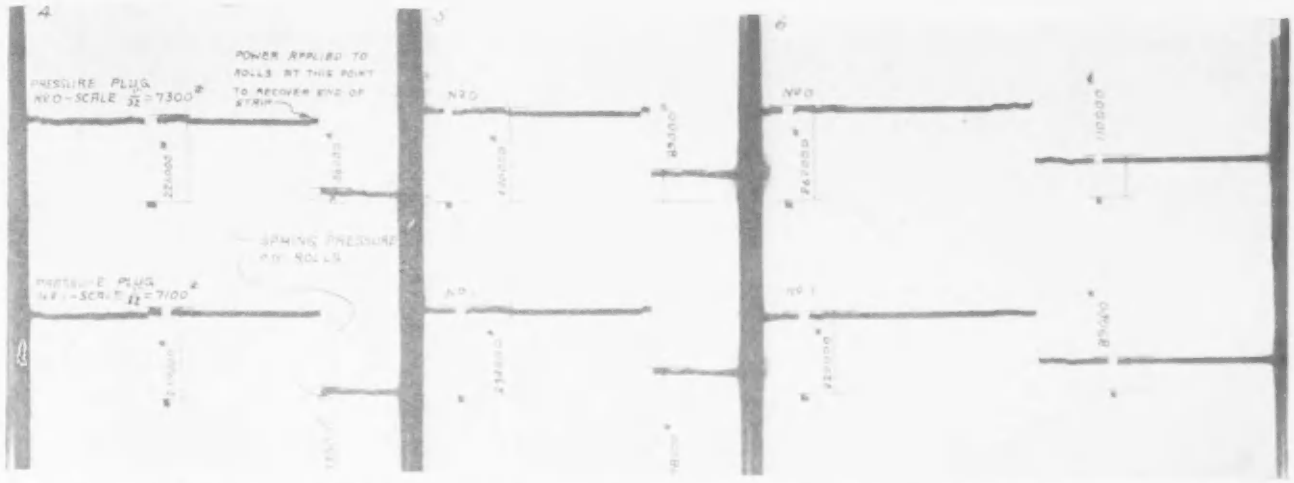
SIX-ELEMENT oscillograph employed in making rolling-mill pressure readings. The camera working with the oscillograph is at the left of the picture.



McCOLLUM-PETERS electric telemeter of 8-in. gage length, with the side plate removed to show the carbon stacks mounted in the frame.



CAMERA with motor-drive oscillograph for recording pressures in rolling-mill work. The panel board shown at left is used for visual readings.



SCILLOGRAPH record of pressures encountered in cold rolling of strip steel. The departure of the indicator line from its normal position measures the pressure, while the length of that departure measures the period of time the metal is in the rolls.

and other parts readily determined, but also the actual time of the pass. The increase in length of pass as the rolling proceeds is clearly indicated.

The instrument promises great possibilities for the designer and operator, not only on account of the ease of installing, but also as an invaluable check on theoretical calculations and actual operating conditions.

Use of Aluminum in Building Cruiser

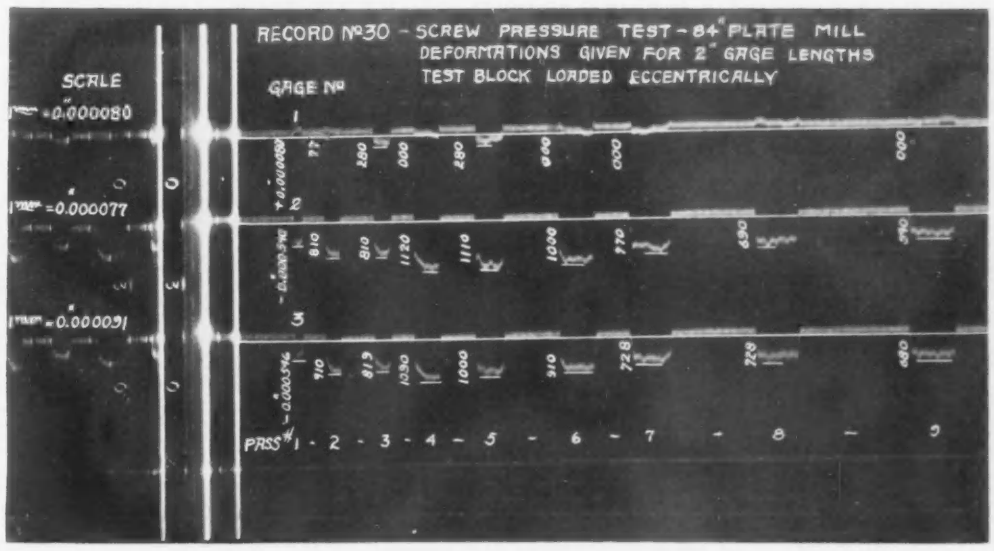
ALUMINUM alloys used in the form of plates, shapes, castings and rivets in the construction of the 10,000-ton United States cruiser Houston amount to more than 33 net tons. Figures given in a discussion of a paper on use of aluminum in shipbuilding, read before the Society of Navy Architects and Marine Engineers last November, include the following:

Plates	Alloy 17-S	27,700 lb.
Shapes	Alloy 17-S	17,700 lb.
Castings	Alloy 43	19,300 lb.
Rivets	Alloy 17-S	1,400 lb.
Total		66,100 lb.

It is reported that this use of aluminum resulted in a saving of 59 gross tons in weight, compared with the equivalent steel. In addition, a saving of almost 14 gross tons was made in the paint used on the ship. About 3700 lb. of aluminum bronze powder was used in making 17,000 lb. of aluminum paint. The saving in weight is by comparison with the previous standard red lead paint.

Some of the uses of aluminum alloy on an earlier 10,000-ton cruiser include bed plates for motors, construction of many parts of the ship's main and auxiliary machinery and, in particular, that part of the equipment connected with the electrical system. It was found that aluminum alloys could be used to advantage in the construction of the main drive reduction-gear housing, casings and pinion frames, centrifugal pump casings and casing covers, blower casings and valve hand wheels of all sizes.

In building this cruiser the electrical department of the New York Navy Yard has estimated that the substitution of aluminum alloy in place of bronze or brass, in electrical instruments and fixtures alone, resulted in a weight saving of more than 80,000 lb. This does not include the various parts of the main propelling plant of the ship. It is reported that silicon aluminum has been found to compare very favorably with copper, not only as a conductor of electricity, but also as a thermal conductor.


RECORD No30 - SCREW PRESSURE TEST - 84" PLATE MILL
DEFORMATIONS GIVEN FOR 2" GAGE LENGTHS
TEST BLOCK LOADED ECCENTRICALLY
SCALE
GAGE No
PASS # 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9

SCILLOGRAPH record of rolling pressures and times taken from an 84-in. plate mill. Deformations are given for 2-in. gage lengths on a test plug loaded eccentrically.

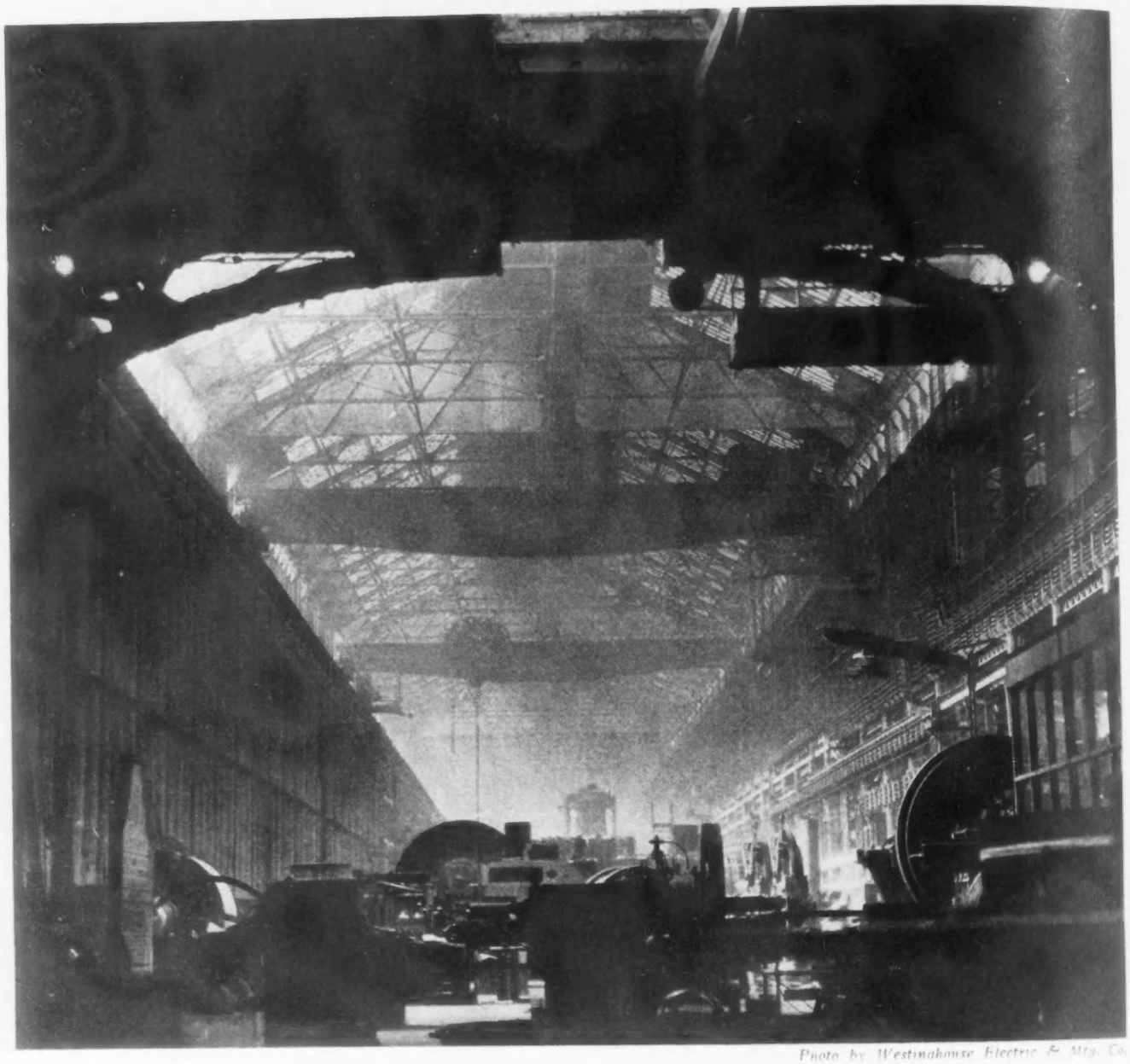


Photo by Westinghouse Electric & Mfg. Co.

THE thought of "accountability and responsibility," transposed from military practice, is applied by Mr. Baron, author of the accompanying article, to the control of materials in industry.

This same thought may be profitably applied as well to the equipment of industry. Consider the tremendous money equivalent of the tools and machinery found in the modern metal-working plant. Accountability for their proper selection, arrangement and maintenance must be definitely placed, and responsibility for their most profitable usage. Unless accountability and responsibility are definitely pinned to individuals, management cannot expect an adequate return in the form of profits on the investment.

Lowered Production Costs from Material Control

PROFITS from material control are dependent upon three rules, states Mr. Baron. First, plan what is to be manufactured and how, when and where it shall be done; second, provide a place for everything and keep everything in its place; and third, provide only the necessary quantity of materials, of the required quality and condition, at the proper time and place. Mr. Baron describes how the Peerless Motor Car Corpn. has successfully applied these rules to its business of making motor cars.

By L. A. BARON

Cost Manager, Peerless Motor Car Corp.

FACTORY operations are controlled by a "mounting schedule" or "production schedule" issued daily, but one day in advance of when production is to start. That is, in view of our processing time of 96 hr., cars needed four days hence must be covered in today's mounting schedule. These schedules are made up to take care of the "sales forecast," and the purchasing department has the responsibility of securing the necessary materials to meet their requirements.

Shortly after the World War we commenced to hear of "hand-to-mouth" buying. I think that the automotive industry was to a great extent responsible for that innovation. After the 1920-1921 depression it began to confine purchases to immediate needs. This soon developed into the practice of limiting orders to those for immediate production schedules, plus vendors' processing and shipping time.

Contracts Cover Year's Requirements

The usual method is first to cover all important purchases by contract. That is, when a vendor's bid is satisfactory, we generally make a contract wherein he agrees to furnish certain materials to comply with certain specifications at a stated price. These contracts usually do not designate a specific quantity, but are worded so as to cover possible production requirements for a year, plus spoilage and service needs. About 99 per cent of them can be canceled; the other 1 per cent, at the vendors' insistence, specify definite quantities as a price guarantee or to cover special tool and die costs.

When contracts for material have been placed, then the actual buying or ordering commences. As the contracts are made to cover yearly requirements, based on a sales estimate made many months in advance, the actual purchase order is released to the vendor to meet the production schedule. This is handled by the purchasing department in a manner which in reality makes it the material control unit.

When we start to build a new line of models, the management gives the purchasing department a "release," specifying a definite quantity of cars for which materials must be secured to start production. Individual purchase orders are issued for the proper quantity of each part or kind of material necessary to complete the release, these orders stating delivery dates to comply with production schedules. As first put out, this schedule is the management's estimate of what can be sold in a given length of time. After it is in operation and materials are ordered to cover it, it is an easy matter to correct subsequent material orders so as to tie in with later production schedules or releases.

A copy of the purchase order, retained in the purchasing department, has the necessary space to record all receipts and is used for follow-up purposes. The department also maintains an individual material record card for each part and kind of material. This card is a record of the material ordered, received and lost to production through scrap, service or returns to vendors. It is the only perpetual inventory maintained in the plant.

Basic Plan for Obtaining Materials Defined

In obtaining materials for the manufacture of Peerless cars, we follow one basic plan: Every part or commodity purchased is for a specific purpose, to fill

a manufacturing need specified in the engineering bill of material. By adhering to this principle, we are able to hold obsolete and useless material expenditures to a minimum.

The purchasing department is responsible for buying materials to comply with engineering specifications as cheaply as good business practice permits, and to get them into the plant to meet production schedules, which usually means as soon as possible.

The material supervisor has charge of all productive material and factory supplies within the plant, including receiving room, interior trucking and stock chasers.

About 90 per cent of the items received pass through the receiving room, where they are unpacked and counted. The other 10 per cent are bulky articles, such as bodies and axles, which are delivered to the first point in the manufacturing line. The receiving department makes out a report for each lot of material received. Two copies of the report go to the purchasing department, to complete its record of the purchase order, one is attached to the vendor's invoice and forwarded to the accounting department, one is retained in the receiving department, one goes to the material supervisor, two are sent with the material through receiving inspection, one is retained by the inspection department, and one is sent to the point on the line where it is used by the department stock man.

All materials are inspected as received, either in the receiving inspection room or on the assembly floors as delivered. While materials are in the process of inspection, they are temporarily out of the jurisdiction of the material supervisor and under the watchful eye of the chief inspector. The latter is responsible to the president of the company; it is his responsibility to see that all parts entering the products meet engineering specifications. His word is final in this respect. Many parts receive 100 per cent inspection, others as low as what we call 10 per cent inspection.

Rejected Parts Covered by Reports

Any part failing to pass receiving inspection is rejected, the material being covered by a "defective material receiving inspection" report, which is made in triplicate. This report gives a complete description of the material, receiving report number, vendor's name, purchase order number, and states why it failed to pass inspection. Where the vendor has not complied with specifications, the report is stamped "Return to vendor for replacement." To cover all vendor defects which are later found in production we use a similar report, augmented by information regarding the department in which the material was found and also how far it had progressed in the manufacturing process. It also is made in triplicate. One copy of these reports is sent to the purchasing department, the second to the cost department, and the third is retained in the inspection department. The purchasing department's copy is used as a requisition for replacement and also to complete the record of losses to production. A shipping order is issued to cover the return to the vendor, who is charged for the material on a debit memorandum and the production material inventory account credited. At the same time, the purchasing department makes out a purchase order to cover replacement of the defective material, thus keeping the stock uniform in volume.

PAGE _____ MODEL _____ GROUP _____ FORM 728 A

MONTH _____ 19 ____

NEW COSTS		VARIATIONS			REMARKS
EACH	PER CAR	INCREASE	DECREASE	REASON	

At end of each month a tly sheet is inserted between the master cost sheets. On it is entered new costs represented by individual cost records taken from file during month.

As soon as a part is passed by the inspection department, it again comes under the jurisdiction of the material supervisor and the stores department must deliver it to the assembly line where it enters the manufacturing process. There are some 200 stations where materials are delivered.

Plant Has No General Store Rooms

There are no store rooms, as that term is generally known, but only a few small rooms, or cribs, in which are stocked such perishable items as trim materials, special fittings and paints. Only materials which are particularly subject to theft are kept under lock and key. These include clocks, speedometer heads, trouble lamps and cigar lighters. As the majority of parts are not interchangeable with the parts of other makes of cars, the company has little trouble from this source.

In the absence of store rooms it is not necessary to fill out requisitions or kit lists for materials used on regular productive operations. If they are used for other purposes, a requisition is made out explaining its need, one copy going to the purchasing department for completion of its records and the other to the cost department.

Control of damaged, broken and scrapped parts is an interesting problem. Such items are cleaned up each day, being passed on by the floor inspector and sent to the salvage department. If the part can be

PAGE_____

MODEL_____ GROUP_____ MONTH_____ 19___

REMARKS	DATE	STATION	PART NUMBER	QUANTITY REQUIRED	COST EACH	COST PER CAR	PART NAME	

Each part comprising an engineering section of the product is listed on a master cost sheet for each model and type of car.

repaired in the plant, the salvage department or some other capable department does this work, charging the labor to the department responsible for the damage. If the part cannot be repaired, it is covered by a "defective material in process" report, copies of which go to the purchasing department, cost department, and material supervisor. This gives a complete description of the part and the extent of defect or damage, as well as department responsible. The face of the report is stamped with suitable wording for each particular case, such as "consigned to scrap bin" for parts which are a complete loss; or "return for repairs at our expense" for parts which can be repaired outside of the plant or by the vendor; or "delivered to obsolete stores" for parts which are discontinued when engineering changes are made. Upon receipt of the report, the purchasing department places the necessary repair purchase order for repairs or to cover replacement and even up the stock. The cost department charges the department responsible with the value of the loss and credits productive material inventory.

Inspectors May Reject Defective Material in Any Department

While all materials in process come under the jurisdiction of the material supervisor, the inspection department has authority to reject any unsatisfactory material in any department. When the inspection department finds material in process which does not meet with specifications, the part is tagged with a defective material tag and sent to the salvage department. A careful examination is made to determine the extent of the defect and the responsibility for it. The department then makes out the necessary defective material report.

As a further means of material control, one person in each department is designated to watch the stock. He may be a member of the stock department or an assistant foreman. On each part a minimum quantity is set to comply with current production schedules. When the supply reaches the minimum, the responsible party makes a report to the material supervisor. These departmental reports are compiled each morning into a "dangerous shortage" report, which is checked against unfilled purchase orders. As a result, steps are taken to expedite deliveries, or purchase orders to cover the shortage are issued.

In the United States Army regulations covering instructions on Government material, two terms are used which could be applied to the control of manufacturing materials: "accountability" and "responsibility." Any officer or soldier who has a receipt for a given lot of material is accountable for it, while all officers and soldiers are responsible for the proper care and use of all military supplies. If these terms were applied to the control of manufacturing materials, it might be said that the purchasing agent, comptroller and cost manager are "accountable" for them, and all other employees, particularly the production manager, materials supervisor, chief inspector, and department foremen, are "responsible" for them.

The purchasing agent is responsible for the quantity of materials received and the price paid for them. The comptroller must put into effect methods which will properly account for all materials received and disbursed. The cost manager must see that these methods are carried out. The shop personnel, consisting of the material supervisor, production manager, store room men and department foremen, must report materials used as well as properly care for them. Whenever material is used for purposes other than originally designated, the shop personnel should

COST department maintains a numerical record of all parts and commodities, each of which is listed on an individual card, as shown, giving latest cost information secured from its copies of purchase orders.

DESCRIPTION PART NO.

B/M AUTHORITY

LAST AVAILABLE COST INFORMATION

No.	DATE	P. O. No.	VENDOR	QUAN.	PRICE EA.	No.	DATE	P. O. No.	VENDOR	QUAN.	PRICE EA.
1						6					
2						7					
3						8					
4						9					
5						0					

DATE	B/M	MODEL	GROUP	QUAN. PER CAR	DATE	B/M	MODEL	GROUP	QUAN. PER CAR	DATE	B/M	MODEL	GROUP	QUAN. PER CAR

see that it is properly reported on requisitions, scrap tickets or other forms.

Although the comptroller and the cost department must account for materials, they cannot do so unless the plant personnel properly reports the usage of all materials. Coaching by the accounting department can usually bring about this cooperation. The production manager, material supervisor and chief inspector are instructed as to how all material usages are to be reported to the accounting and material control departments. They in turn pass these instructions along to foremen, stockmen and others responsible for materials. Physical inventories, coupled with a minimum of current shortages, show that these men appreciate their responsibility.

List of Costs of All Parts Maintained

The cost department maintains a numerical list of all parts and commodities, giving the latest available cost information secured from its copies of purchase orders. Each part is listed on an individual card which gives a description of the material, the purchase order number and date, vendor's name, quantity covered by the order, and the price per unit. The bill of material information on the card gives the bill of material date and reference number, the model, the bill of material group in which the part or commodity appears, and the quantity used per car.

The Peerless standard cost plan for production of its cars is an interesting development. The bill of material, as furnished by the engineering department, is broken up into sections corresponding to the sequence in which a car is built up on the line, such as frame, running gear, wheels, axles, engine and body. Listing each part which comprises an engineering section, master cost sheets are made up for each model and type of standard car. (A standard car is the car and equipment advertised by a manufacturer at a certain price, f.o.b. factory.) The part number, name, and usage are specified. Each individual part is priced as well as the cost of the part per car. The cost of all parts comprising a section then is totaled. The aggregate cost of all sections added together is the total material cost per car.

When a purchase order carries a new price for a part or commodity, the change is entered on the record card which is removed from the file. At the end of each month a fly sheet is inserted between the master cost sheets. On it are entered the new costs represented by the individual cost records taken from the file during the month. Old costs which are still effective are written in, totals are obtained by adding individual items and a new cost for each section is made up.

A monthly summary of these costs, by model and bill of material sections, gives a new production cost in the aggregate. The corrected cost sheets, as represented by the fly sheets, tell where cost changes have occurred. From the summary of the cost by models for the month, it is easy to compute the plant's entire production cost. It is simply a case of multiplying cost per unit by units produced. The total material cost, plus labor, burden, etc., constitutes the cost of production and is charged to the finished car inventory.

Each month the cost department furnishes the management with a list of production items, the cost of which has changed since the preceding month. This report gives the part number, part description, cost change, and reason for the change. Material costs change only for two reasons—fluctuation in commodity price or change in usage. If the former is responsible, the management checks the cause with the purchasing department. Any change in usage must have first been authorized by an engineering change analysis, the number of which is shown in the cost change report.

This method of material cost accounting is satisfactory not only from the standpoint of material costing (our unaccounted for inventory losses being less than half of 1 per cent), but also because it is an economical system to operate, requiring less than full time of one clerk in the cost department to keep the records.

Three Rules for Material Control

The manufacturer who wishes to profit from material control must use as the groundwork of his plan these three rules:

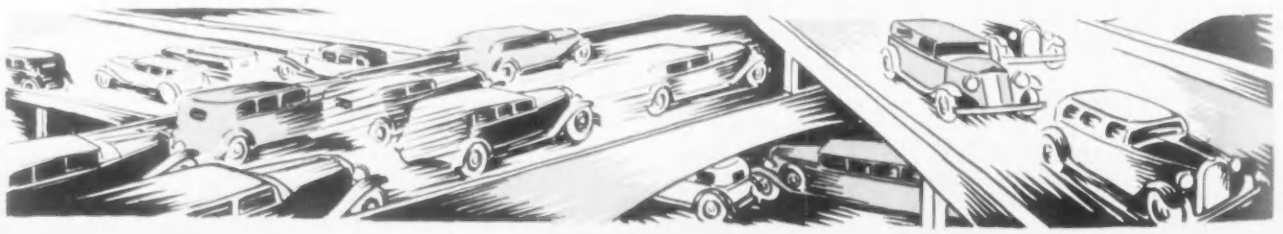
First: Plan, before work is started, what is to be manufactured, and how, when and where it shall be done.

Second: Provide a place for everything and keep everything in its place, with adequate supporting records.

Third: Provide only the necessary quantity of materials, of the required quality and condition, at the proper time and place.

This is the basic plan back of the line system of production. It is not applicable to the manufacture of all commodities, but there are still many items which could be produced in this manner. Any item of a standardized nature, manufactured in quantities, can be made on an assembly line. To do so would lessen manufacturing cost, and in many instances increase quality. When properly planned and supported by proper material control, this method reduces inventory investment, direct labor cost, and general manufacturing overhead expenses.

Economists say that since 1921 the average commodity dollar has fallen to 62c. On the other hand, the automobile dollar has increased to $1.22. It is generally conceded that pre-planning of production, combined with standardization and adequate control methods, has been an important factor contributing to this impressive gain in the buying power of the automobile dollar.



MANHATTAN ISLAND, the greatest structural steel market in the world, as seen from an airplane. This photograph brings into clear relief the areas of most marked development in the building of skyscraper structures—the one at the lower end of the island and the other in the district surrounding the Pennsylvania and Grand Central railroad stations. ▲ ▲ ▲

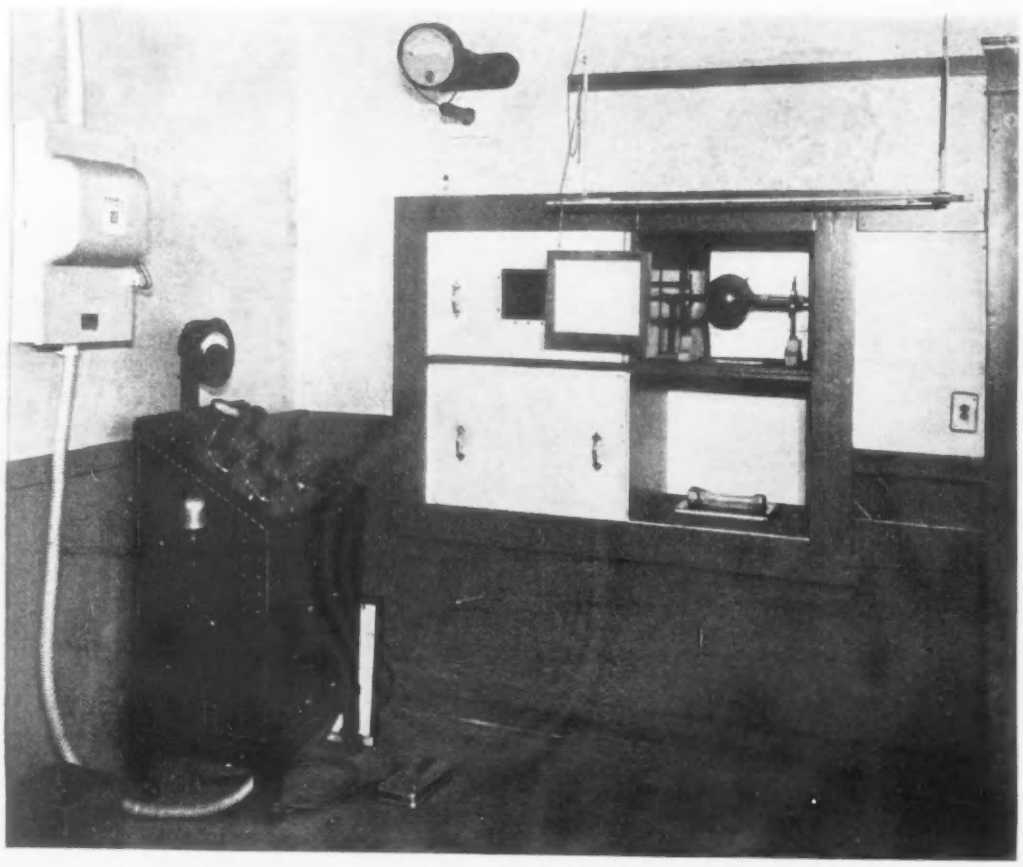
X-Ray Inspection of Castings and Forgings

X-RAY equipment for the inspection of aluminum castings and forgings and steel forgings used in the manufacture of airplane motors recently was installed by the Smith Engineering Co., Cleveland. While at present the equipment is used in connection with experimental work in the design and construction of water-cooled motors for airplanes, it was provided to make X-ray inspection on a production basis of aluminum parts, such as cast cylinder heads, crankcases, pistons and forged main bearing cups and flanges, and of some steel members—crankshafts, cylinders and gears. In fact, the apparatus will be used for inspection of practically all parts when the plant gets under production.

The X-ray equipment in the Smith plant is arranged for both radiographic and fluoroscopic examination of parts, in order to reveal, by X-ray, flaws, porosity, cracks, blow holes and foreign matter in the metal and to permit the rejection of parts having imperfections, rather than to wait until the imperfections are brought out by machining operations.

The equipment is located at one end of an inclosed inspection department at one side of the machine shop. This department has two windows, which are provided with sliding wood curtains so that the room may be darkened during X-ray examinations. The high-potential power plant, including a high-voltage transformer and mechanical rectifier, and the X-ray tube are located in a lead-lined room, a tube being placed in a radiographic cabinet about 2 ft. square and the same height, access to which is had through a small door opening. The control cabinet, equipped with various meters, stands in front of the lead-lined room. The direct-current voltage is stepped up in the transformer to a maximum of 165,000 volts.

Suspended in a fixed position, about 12 in. in front of the radiographic cabinet door, is a fluorescent screen about 8 x 10 in. in size. Against the back of the screen is a sheet of bakelite through which the X-rays pass, and the front is covered with lead glass to prevent the X-rays from passing beyond the screen. In the door in front of the radiographic cabinet is a



RADIOGRAPHIC cabinet used in making X-ray examinations of airplane motor castings and forgings at the plant of the Smith Engineering Co. Fluoroscopic examinations are made by holding the piece between the X-ray tube in the cabinet and the fluorescent screen suspended in front, on which a shadow picture is produced. The control cabinet is shown at the left.

BOTH radiographic and fluoroscopic examination of castings and forgings by X-rays is possible with the equipment in the Smith Engineering Co. plant. The object is to detect flaws, porosity and other imperfections before machining and thus to prevent waste of labor.

Inspection is rapid and 50 pieces an hour can be examined on a production basis.

small opening directly in front of the X-ray tube and through which the X-rays pass to the screen. In making examinations the inspector, standing in front of the screen, holds a piece to be examined between the screen and the cabinet and a shadow picture is produced on the screen.

Inspection is rapid, as the inspector holds the piece back of the screen only long enough to determine by quick optical inspection of the shadow picture whether there are defects in the piece. If imperfections appear, he makes out a rejection slip. When inspecting on a production basis it is expected that 50 pieces an hour can be examined. Aluminum pieces up to 2 in. or more in thickness can be inspected by the fluoroscopic method. This method cannot be used for examining steel except for very thin sections.

When radiographic examinations, mostly of steel, are to be made, the X-ray tube is turned around 90 deg. and in that position the rays are thrown downward in the radiographic cabinet in which the piece is placed between the focus of the X-ray tube and the X-ray film. The exposure time is 15 to 25 sec. for the work handled. The X-ray equipment was made by the Kelley-Koett Mfg. Co., Covington, Ky.

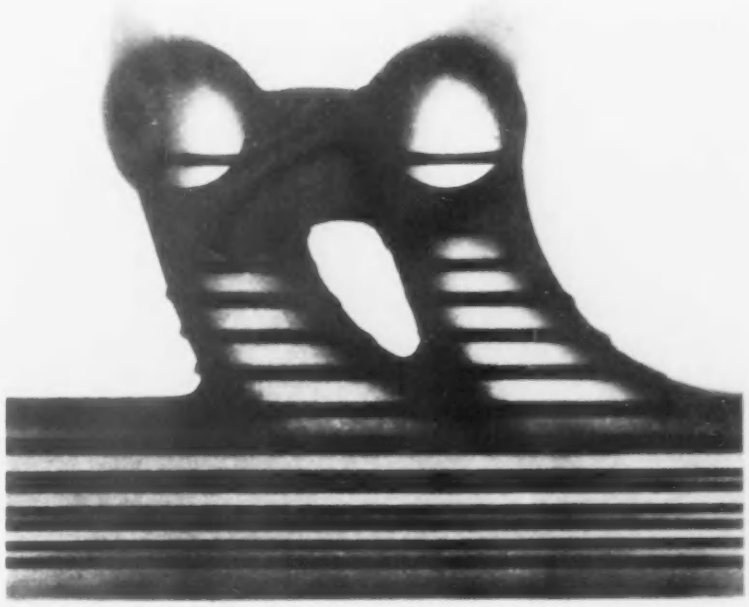
AN illustrated pamphlet on the cleaning of metals, prepared by Robert W. Mitchell, has been issued by Magnus Chemical Co., Garwood, N. J. It has 76 pages and is well illustrated.

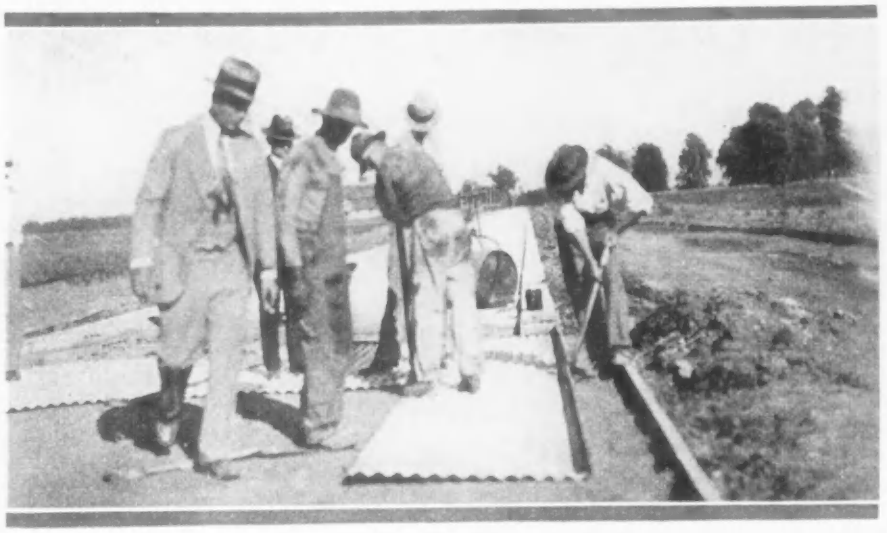
While relating mainly to the product of one manufacturer, it is prepared in technical style and is of general application. Primarily the cleaning referred to takes place in four steps:

Wetting of surface and penetration of the dirt by the cleaning solution; emulsification of dirt and grease by the combined action of the cleaner, agitation and heat; stabilization of emulsion or dirt suspension by soap or other film; dilution of emulsion and its removal by rinsing.

RADIOGRAPH (above) of an airplane motor connecting rod of forged aluminum. The dark spot shown in the center of the web was caused by a small piece of bronze imbedded in the aluminum.

RADIOGRAPH of a cast aluminum exhaust manifold (right). Dark spots on the picture indicate blow holes.





WORKMEN laying a span of the world's first metal-base highway, which was completed last summer near Springfield, Ill. In this operation the Armco corrugated iron sheets that were used for the base are being tamped into place and the curb is being kept in alignment.

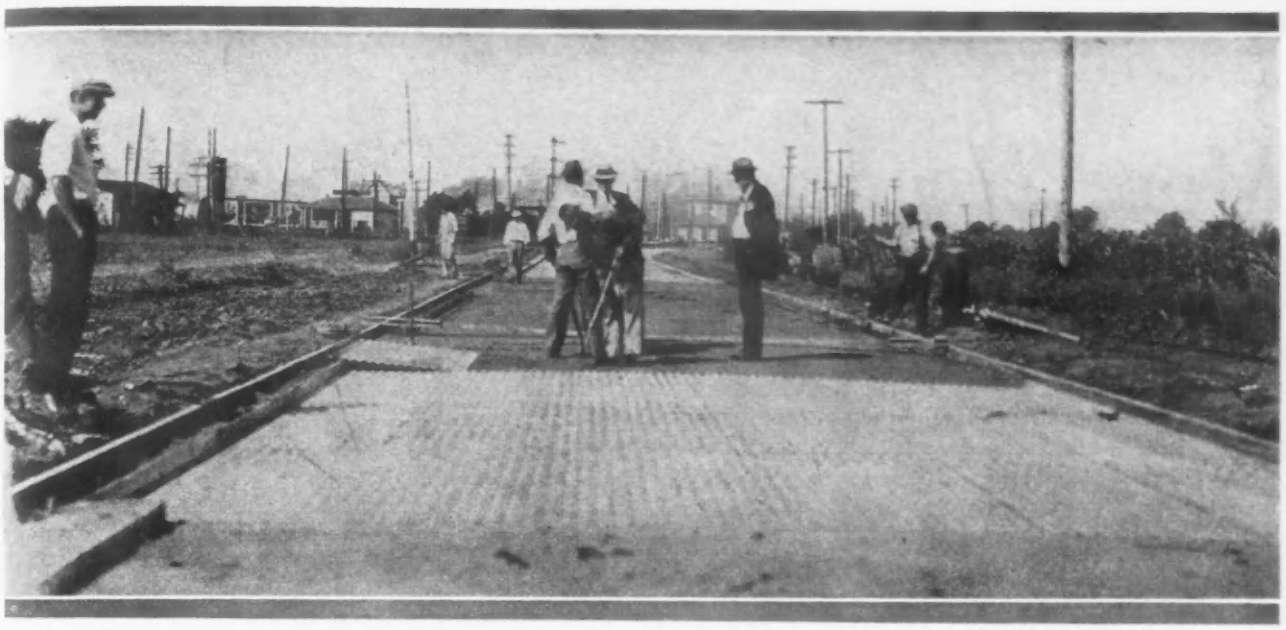
Use of Iron Sheets and Steel Curb for Roads Expected to Grow

WITH the vast amount of highway construction to be undertaken this year, it is believed to be quite likely that further development will come of the use of iron sheets for road base, which was tried out experimentally last summer near Springfield, Ill.

The National Association of Flat Rolled Steel Manufacturers, Cleveland, has announced that W. H. Moseley, paving engineer of Springfield, Ill., who was largely responsible for the experimental highway with metal base, has invented a new steel curb, to be made of hot-rolled strip steel.

The new steel curb design calls for two strips of steel, one on each side of the pavement, held together by strip steel tie rods running across the pavement at necessary intervals. The rods are buried deep in the cushion in the case of brick resurfacing or in the asphalt in the case of bituminous resurfacing. The steel would be suitably coated to prevent corrosion. In the case of a brick surface 3 in. thick with a 1-in. cushion,

THE metal-base for the Illinois road consisted of three 50-ft. sections, one of ¼-in. blue annealed flat sheets and two of No. 10 gage galvanized, corrugated sheets. The illustration shows the blue annealed sheet section in the foreground and the galvanized, corrugated sheet section next to it. After the iron base and curb were laid, a mastic sand cushion was put on top and then the brick surfacing.



THIS view shows three complete sections of the metal-base highway. The sheets are laid with the corrugations parallel to the center line of the highway, and are placed on top of the concrete base, which is shown in an adjoining section of the road.

Cross-section of road, showing metal curb and tie rod construction for highways.

the steel curb would be 6 or 8 in. wide. Four inches would extend above the old concrete pavement, and the remainder would rest against the side of the old concrete pavement and be held rigidly in place by the tie rods.

In this type of construction, the inventor of the idea estimates that as much as $4,000 a mile can be saved. This is figuring on the basis of $6,000 a mile for concrete curbs against $2,000 a mile for steel curbs.

Accompanying illustrations show how the experimental highway in Illinois was laid. Details of this work were published in THE IRON AGE of Aug. 21, 1930, page 507.

Work-Hardening of Some Materials by Cold Rolling

THE influence of the amount of reduction by cold rolling on the strength properties of various carbon steels and alloy steels, also monel metal, has been studied by E. Greulich, according to an article, "The Work-Hardening of Some Materials by Cold-Rolling," in *Stahl und Eisen*, Oct. 2, 1930, pages 1397 to 1401. The steels used were five carbon steels with carbon ranging from 0.12 to 0.61 per cent, three chromium steels with 12.5, 15.3 and 14.5 per cent chromium, a 5 per cent nickel steel, and a nickel-chromium steel with 35.20 per cent nickel and 10.50 per cent chromium. The materials were supplied in the form of 40 mm. square bars.

The carbon steels and nickel steel were rolled down to 12 mm. square rods and the chromium and nickel-chromium down to 14 mm. square rods. The carbon steels were annealed for 3 hr. at 650 deg. C. and the nickel steel at 610 deg. C. The chromium steels were brought into the pearlitic state by annealing for 7 to 9 hr. at 900 deg. C., followed by slow cooling to 700 deg. and air cooling from that point. The austenitic Ni-Cr steel was annealed at 1100 deg. for 2 hr. and quenched in water.

The scale was removed from all the pieces by pickling. The bars were then reduced by rolling by about 50 per cent in cross-section. A reduction of 1 per cent produced an effect on the hardness, elastic limit, and elongation. The tensile strength did not, however, show any increase till a 6 per cent reduction was reached. The values of these properties reach their approximate maximum at a reduction of about 10 per cent, with the exception of the contraction of area which continues to diminish with further cold-working. An exponential law is valid for the relation of hardness, elongation, and tensile strength to reduction by cold-rolling up to 30 per cent. By the application of this it is shown that the work-hardening of carbon steels takes place to the same degree, irrespective of the carbon content. Both the austenitic nickel-chromium steel and the monel metal (which was similarly treated) show a much higher degree of work-hardening, which would indicate that composition and lattice structure play an important part in their case.

More Zinc and Zinc Alloys Used

By ROBERT M. CURTS

A FEW years ago the use of zinc in the automotive industry was limited to the tonnage employed in the manufacture of brass for certain cast and fabricated parts, to a relatively small consumption in electro-galvanizing various steel parts to prevent rusting, and to a fair consumption in the form of rolled zinc for meter cases, running board moldings and door plates. But brass radiators and many other brass parts were replaced with plated ferrous materials and it looked as though the consumption of zinc might become insignificant in one of the country's largest industries.

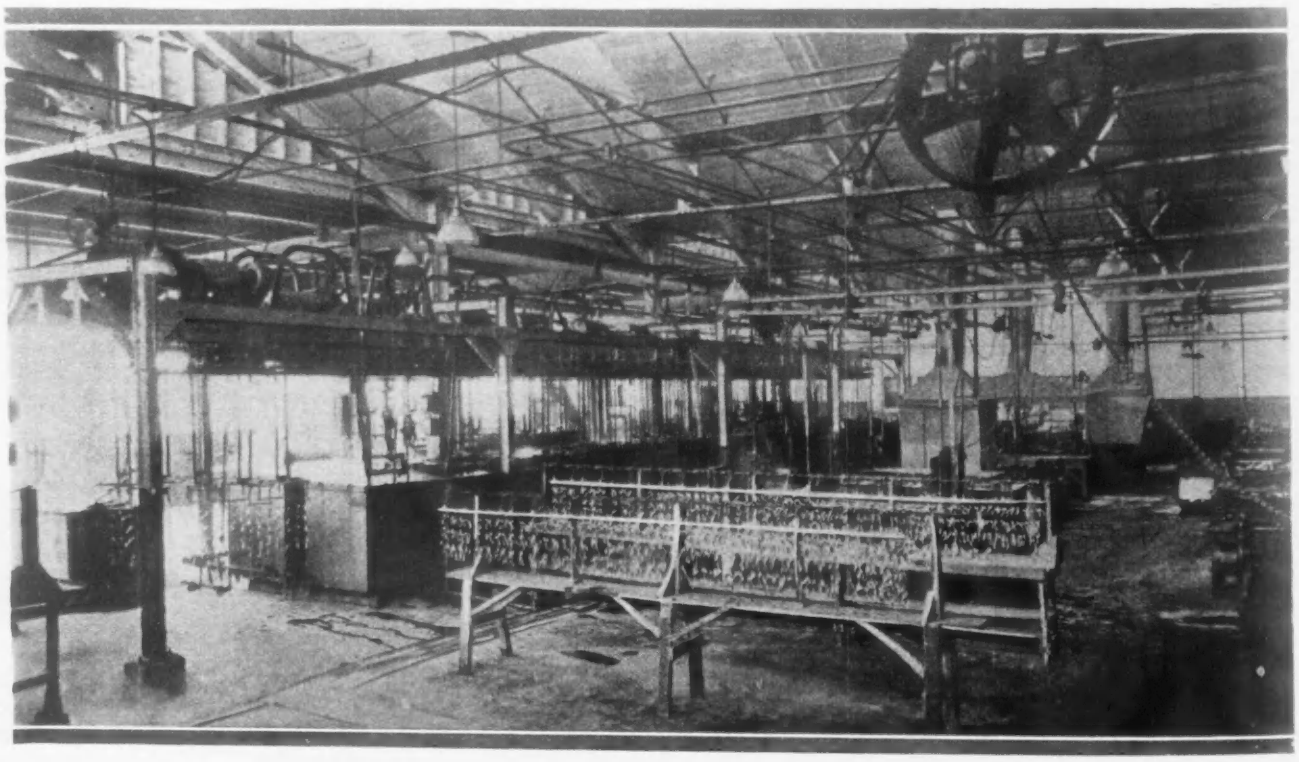
For several years cadmium plating and other rust-proofing methods have been substituted for electro-galvanizing to a considerable extent. It was found that certain patented rust-proofing processes afforded a satisfactory surface for subsequent enameling or lacquering at reduced cost. The silvery-white appearance of cadmium plating was thought to be more pleasing than the blue-gray of zinc; but, inasmuch as cadmium is much more expensive than zinc, a stronger argument had to be found before it was adopted. This was based on its superior resistance to corrosion in the salt spray test, the interpretation of which has caused much critical comment.

Until recently zinc was available only in the form of unalloyed strip and sheet, having a relatively low tensile strength compared with brass and other materials which it might economically replace. Moreover, unalloyed rolled zinc is practically self-annealing at normal temperatures and has a tendency to "creep" or take a "permanent set" when subjected to sustained load. The zinc industry soon recognized that, if the use of rolled zinc in the automotive industry was to increase, alloys must be produced which could be commercially rolled and which would have physical properties similar to those of brass and other commonly rolled alloys. Further, a suitable plating process must be found. Although these alloys are still somewhat in the experimental stage, they promise to contribute to manufacturing economies.

A plating technique has been developed which re-

PLATING room (below) of large modern die casting plant where thousands of zinc alloy die castings are finished daily.

INTERIOR of die casting plant of AC Spark Plug Co. (opposite page), showing battery of automatic, motor-driven machines for production of fuel pump bodies, speedometer frames, instrument panels, carbureter parts, etc.



in Automobiles

sults in the deposition of tough, dense, adherent coatings on zinc or zinc-alloy surfaces. It has been the prime factor in new applications of ordinary commercially rolled zinc, satisfactory from the standpoint of strength, for cowls, drip and splash-guard moldings, trunk rack and gasoline tank trim, gasoline tank and radiator caps, escutcheons, switch plates, flexible cables, dome lamps, ash receivers, engraved instrument panels and running board moldings.

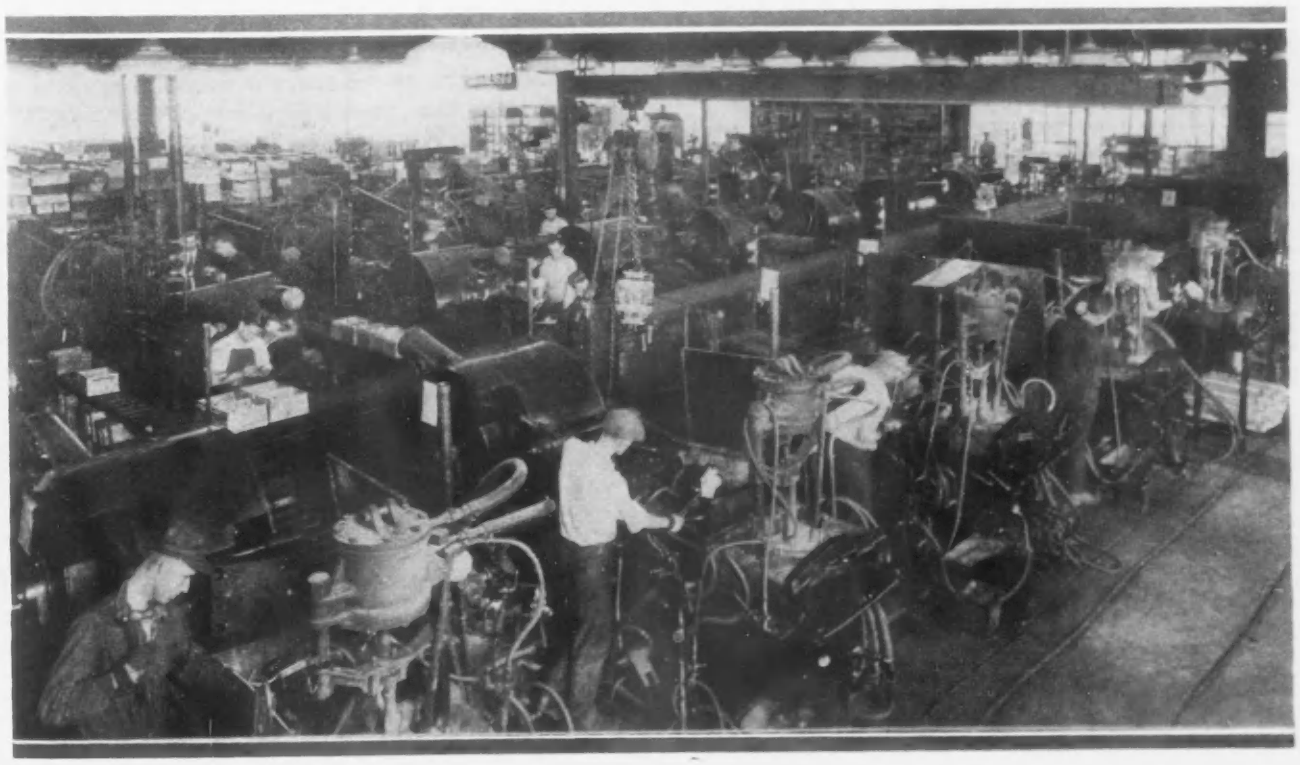
Chromium-Plated Zinc Developed

Ordinary rolled zinc has long been used for running board moldings. Unlike plated steel, it will stand considerable abuse without serious corrosion, but is subject to tarnishing unless protected by lacquer. Before the advent of chromium plating, the tarnished zinc molding was not a serious problem, but with the brighter finish of chromium on lamps, bumpers and other parts, the dull zinc and aluminum moldings were considered more critically. The result has been successful experiments in the past year with chromium-plated zinc, several manufacturers having specified it for their 1931 models.

Tests made in the Chrysler engineering laboratories on commercially-plated zinc running board molding showed that, after 70 hr. of continuous exposure to the salt spray, the surface was as good as when

METALLIC zinc is widely used in the automotive industry, where it is employed for electro-galvanizing, as a constituent of brass, as rolled sheet and strip for a variety of fabricated parts and in the production of a large number of die cast parts. Attractive and durable plated finishes can now be applied without difficulty to zinc and zinc alloy parts. The number of automobile parts made of these materials is increasing, and investigations are in progress looking toward the manufacture of still other zinc alloys with suitable properties for use in a wider range of automotive parts.

This article is an abstract of a paper presented at the annual meeting of the Society of Automotive Engineers in Detroit, Jan. 19 to 23. The author was engineer, New Jersey Zinc Co., New York, when the paper was presented but is now with the American Potash & Chemical Co., New York.



received from the factory. This test in itself does not mean much, but indicates that a continuous plate of chromium can be applied to zinc if the proper procedure is followed. Of greater importance is the practical service test conducted by the same laboratories. A set of chromium-plated moldings was installed on one of the service cars and, after eight months' continuous use, was found to be in excellent condition.

There has been an appreciable increase in the production of zinc wire for the manufacture of brake linings. The substitution of zinc for brass wire is said to cut down the scoring of the brake drum and add to general braking efficiency.

Ductile, relatively soft, extruded zinc shapes have recently been made available for drip and body molding. Here again the ease with which tough, adherent plated coatings can be applied probably will make the material of special interest to body engineers. Zinc has the advantage of being a white, non-rusting base so, in the event of a scratched or worn plate, no great contrast is evident.

FLEXIBLE tubing fabricated of rolled zinc and finished in chromium plate.

Large Consumption of Zinc-Base Die Castings

The die casting process is well adapted to high-speed production, which is one reason why the automotive industry consumes well over 60 per cent of the total yearly output of zinc-base alloy die castings. The speed and efficiency of the process are responsible for the reduction in cost of many automobile parts. Limitations as to size have not yet been reached. A cowl bar weighing 14 lb. and having an over-all length of 41 in. has been made in a duplex die casting machine having two "goosenecks" and two separate entrances at opposite ends of the die. Accuracy consists of plus or minus 0.002 in. per in. up to 3 in. with plus or minus 0.001 in. per in. for longer work. A draft of 0.002 in. per in. is desirable on all cores. In some castings, tolerances are even closer. The possibilities for both utility and beauty through design are practically unlimited.

For the manufacture of zinc-alloy pressure die castings several types of automatic machines are used. The so-called air type employs air pressure at 250 to 500 lb. per sq. in., which exerts its force directly on the surface of the molten alloy, forcing it through the nozzle of the "gooseneck" into the die cavity. The plunger type uses air pressure at 75 to 125 lb. per sq. in., the force of which actuates a plunger or piston, this in turn pushing the molten alloy into the die. Here the actual pressure depends not only on the air pressure, but also on the relationship between the size of the piston in the air cylinders and the size of the plunger in the metal container.

A patent has been granted recently on a new zinc die casting alloy containing approximately 4 per cent of aluminum, 0.1 per cent of magnesium and 95.9 per cent of high purity zinc. This alloy has about 25 per cent less tensile strength than the "4-3-0.1" alloy, but seems to be better in impact strength and apparently undergoes less dimensional change upon aging. While its casting properties are fully equal to those of the "4-3-0.1" alloy, it is too early to predict what its commercial status will be. In fact, Zamak No. 2, the "4-3-0.1" alloy made with high purity zinc, is the most popular zinc die casting alloy today and engineers have confidence in it.

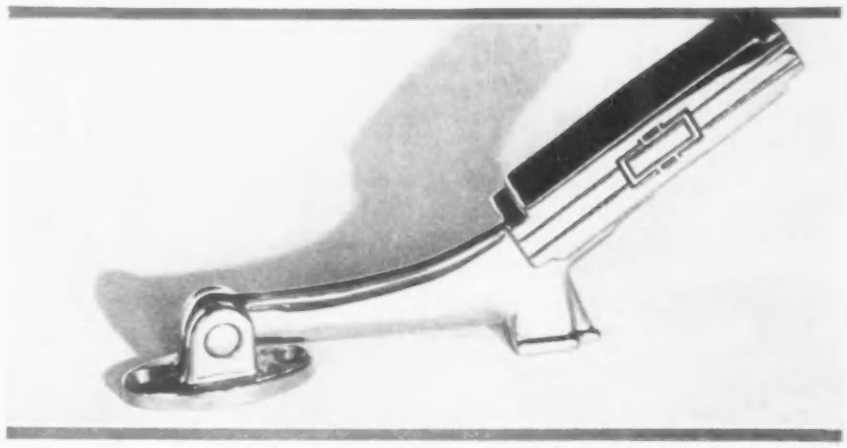
After investigating the commonly used commercial zinc die casting alloys, a sub-committee of committee B-6 of the American Society for Testing Materials has suggested the following composition: Aluminum 3.50 to 4.50 per cent; copper 2.50 to 3.50 per cent; magnesium 0.05 to 0.12 per cent; lead 0.010 maximum; cadmium 0.005 maximum; tin 0.005 maximum; other impurities 0.020 maximum; the balance zinc. It is further recommended that the impurities in the zinc shall not exceed 0.02 per cent.

Alloys of this type are now being extensively used in the production of numerous die-cast automotive parts, including instrument panels, steering wheel levers, fuel pump casings, carbureters, body hardware, cowl bars, windshields, magneto and distributor housings, and body moldings.

Wear Resistance of Die Cast Gears

An investigation of the wear resistance of zinc-base die-cast gears in comparison with standard cut-brass gears showed that the former deteriorate more rapidly than the latter when lubricants containing acid animal fat are used. Where no lubricants or lubricants showing no acid reaction were used, the die-cast zinc alloy gears were markedly superior to brass gears. However, cut-brass gears have better wearing qualities than die-cast zinc gears when kept thoroughly lubricated with light mineral oil. Under like conditions, cast iron gears also were better than die-cast zinc gears. When the gears are run dry, die-cast zinc gears are superior to steel gears. They also require a breaking load of 3461 lb. per in. of face, as compared with 1996 lb. per in. for cast iron.

A large tonnage of zinc alloy goes into the production of automobile body hardware. The fine-grained smooth cast surface secured by using polished dies, which are properly gated and vented to eliminate "run marks," is especially suited for attractive plated finishes. Laboratory corrosion tests have shown that reasonably good commercial gasolines, including "ethyl" and "high test," have no corrosive effect on zinc or zinc alloys. Specimens immersed in the same fuels to



FOOT-REST bracket finished in bright nickel and decorated with black enamel. A large portion of the total consumption of zinc-base die casting alloys in the automobile industry is used in production of body hardware.

which water had been added underwent slight corrosion with the formation of a slight amount of fluffy white precipitate in those areas in contact with the stagnant water.

It is not practical to use zinc alloy die castings where they will be subject to high temperatures, as they melt at about 393 deg. C. and undergo undesirable changes in physical structure at about 260 deg.

The aging of zinc-aluminum alloys of the type employed for die casting is usually accompanied by a dimensional change and also a change in physical properties. It is important for the engineer to know something about these aging phenomena so that he may understand the great improvements that have been made in zinc die casting alloys in the last few years. Aging may be due to inter-crystalline corrosion or to a phase change within the alloy itself.

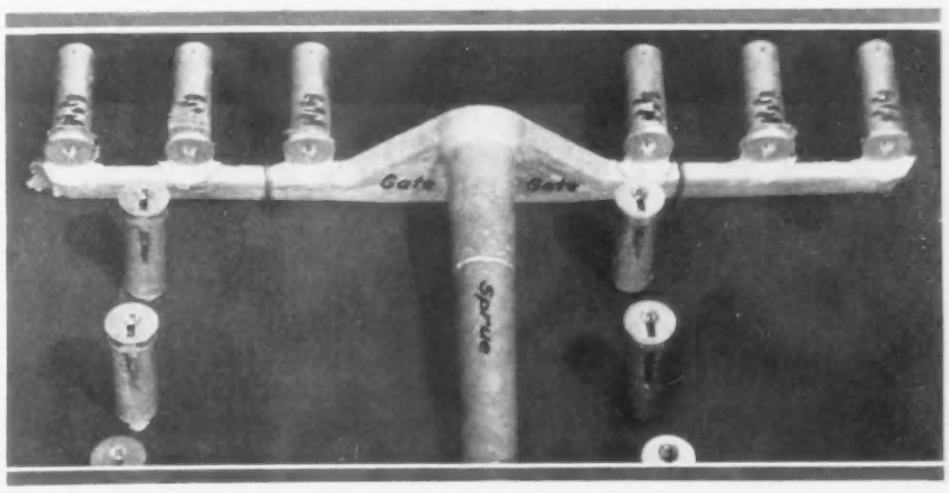
The first serious difficulties encountered with zinc alloy die castings resulted from exposure to high humidity and relatively high atmospheric temperature. This suggested the use of artificial atmospheres, abnormally high with respect to temperature and moisture, as an accelerated means of determining the relative resistance to inter-crystalline corrosion of various alloys under observation. As a purely qualitative means of determining the relative properties of zinc alloys, this test has been of considerable value but, like the salt spray test in studying plated coatings, must be used with discretion.

Too much emphasis cannot be put on keeping the die casting free from contamination, for the inherent quality of the finished product for the most part is governed by the impurities in the alloy from which it is made. Lead, cadmium, iron and tin are the impurities most likely to be found. Lead, cadmium and iron may originate in the zinc from which the alloy is made; both lead and tin may be present through careless contamination in the alloy or in the die casting plant. The effect of abnormal iron content is not as serious as high lead or cadmium content, but is likely to affect the fluidity of the alloy when being die cast and may result in surface defects on the finished castings.

Tin is an extremely undesirable impurity. It will cause early failure on account of excessive dimensional changes, such as warping, swelling and cracking, all of which are accompanied by a marked loss in tensile and impact strengths. The tin content of the finished castings should be less than 0.005 per cent.

Physical Properties of Zinc-Base Die Castings

Tensile strength, percentage of elongation, impact strength, compressive strength, Brinell hardness, Shore scleroscope hardness and Rockwell hardness have all been determined for commercial zinc-die casting alloys. The tensile strength is determined with a pulling speed of 0.266 in. per min. Both round and flat test specimens are used because each represents a different structure which might be obtained in a commercial die casting. The flat test-specimens, $\frac{1}{8}$ x $\frac{1}{2}$ in., usually indicate slightly higher strengths because they are more readily chilled in the casting process



AUTOMOBILE lock cylinders attached to the gate and sprue as removed from the die. These cylinders are cast of the "4-3-0.1" alloy in a six-cavity die, subsequently being broken from the gate, trimmed, buffed and plated.

and hence possess a finer grain. The center of the round bar, of $\frac{1}{4}$-in. dia., has a coarser grain-structure because it cools less rapidly. The percentage of elongation is usually determined from the round tensile bar pulled at a rate of 0.266 in. per min. Measurements are made on a 2-in. gage-length.

The impact strength, or resistance to breakage by impact forces, is determined on a machine of the Charpy type using the $\frac{1}{4} \times \frac{1}{4}$ in. square-specimen die-cast in the A. S. T. M. die. The energy absorbed, divided by the area of the cross-section, is calculated to foot-pounds per sq. in. Compressive strengths are determined by machining die-cast specimens into cylinders 1 in. in diameter and 2 in. long. These are then tested in a 100,000-lb. capacity Olsen machine. Brinell hardness is determined on the end of the flat die-cast tensile-bar using a 10-mm. ball with a 500-kg. load for 30 sec.

Use of Inserts to Impart Greater Strength

Inserts are sometimes used in zinc alloy die castings to impart greater strength or elongation at localized points, giving the properties of a wrought structure where a cast structure would not serve satisfactorily. Fears that inserts may come loose in the casting are unwarranted, as it is virtually impossible to twist them loose and castings must be broken before they can be released. Inserts are occasionally employed to give hardness or special wearing qualities and also to afford the special bearing properties of the bronze alloys. Specific electrical properties also can be obtained through them. Laminated pole-pieces can be made an integral part of a casting for the manufacture of electrical appliances, such as magnetos and generators. The increased cost of inserts is likely to be offset by economies in assembly operations. The die casting process is much more versatile in this respect than many other production methods which involve welding, soldering, brazing or mechanical couplings.

The tensile strength of Zamak No. 2 (4 per cent of aluminum, 3 per cent of copper, 0.05 to 0.1 per cent of magnesium and the balance special high-grade zinc) is more than 50 per cent greater than that of cast brass and about 50 per cent more than that of the cast bronzes. The percentage of elongation and impact strength of both cast brass and cast bronze is greater than of die cast Zamak No. 2, but the latter's toughness is a feature. The tensile strength of Zamak No. 2 will run at least 25 per cent higher than that of cast iron, while the elongation and the impact value are at least ten times greater.

When rolled zinc, rolled zinc alloys and zinc-base die castings are to be plated, it is advisable to apply first a coating of nickel. Subsequent finishes, such as chromium, copper, silver and gold, can then be put on in the usual way. It is possible to apply a fairly satisfactory chromium plating directly on zinc, but generally this requires considerable polishing to effect a bright plate and great care must be shown to avoid cutting through to the zinc base, which, being quite like chromium in color, is difficult to recognize until it has had time to tarnish.

Cleaning is perhaps the most important operation. If improperly done, it will result in pitting, blistering and flaky coatings. The most satisfactory clean[ing] solution is tri-sodium phosphate (6 oz. per gal. water), used boiling hot, as an electro-cleaner with the parts as the cathode and with sufficient current to cause gassing. The addition of sodium hydroxide (1 oz. per gal of water) and sodium cyanide (1 oz. per gal. of water) has been suggested.

Appreciable amounts of strong alkalies or of cy[a]nides should be avoided, as they promote formation of dark films on the zinc pieces, the deposition of which adversely affects the adherence of the primary coat. It is common practice to use an acid dip to etch the surface slightly and improve adherence. For this purpose a weak solution of hydrochloric acid, 10 per cent by volume, or a 1 per cent solution of hydrofluoric acid, is desirable. Usually a 30 to 60 sec. dip is sufficient, after which the castings or fabricated zinc pieces are rinsed in cold water and are ready for the plating bath.

In connection with nickel as a primary coat, the introduction of metallic zinc into a nickel solution without any current flowing results in the formation of a black spongy deposit of nickel. Some zinc goes into solution at the same time. The deposits are composed of nickel and zinc intermixed and are useless as corrosion-resistant coatings.

Three methods have been proposed for preventing the immersion deposition: Increasing current density in a separate strike solution, adding sodium citrate, and then adding sodium sulphate. The first method is unsatisfactory, some streaking occurring even at the highest current densities and the coatings being hard and brittle. While the citrate bath has been used commercially with some success, the higher efficiency, greater throwing power and greater ease of maintaining the sulphate bath seems to make it the more desirable.

A Sulphate Bath Recommended

The following sulphate bath has been used successfully and is recommended for rolled zinc and zinc base die castings:

	Oz. per Gal.	Grams per Liter
Single nickel salts	10.00	75
Anhydrous sodium sulphate*	15.00	113
Ammonium chloride	1.75	13
Boric acid	2.00	15

*If hydrated sodium sulphate is used add double the amount.

The best concentration of sodium sulphate in the bath depends upon the size and shape of the articles plated. For a flat object the concentration can be reduced to as low as 8 to 10 oz. per gal. For complicated shapes streaking will occur in the recesses unless the sodium sulphate is raised to 15 to 16 oz. per gal. Where a number of different articles are being plated in the same tank, the sulphate should be sufficient to prevent streaking in the most complicated object plated.

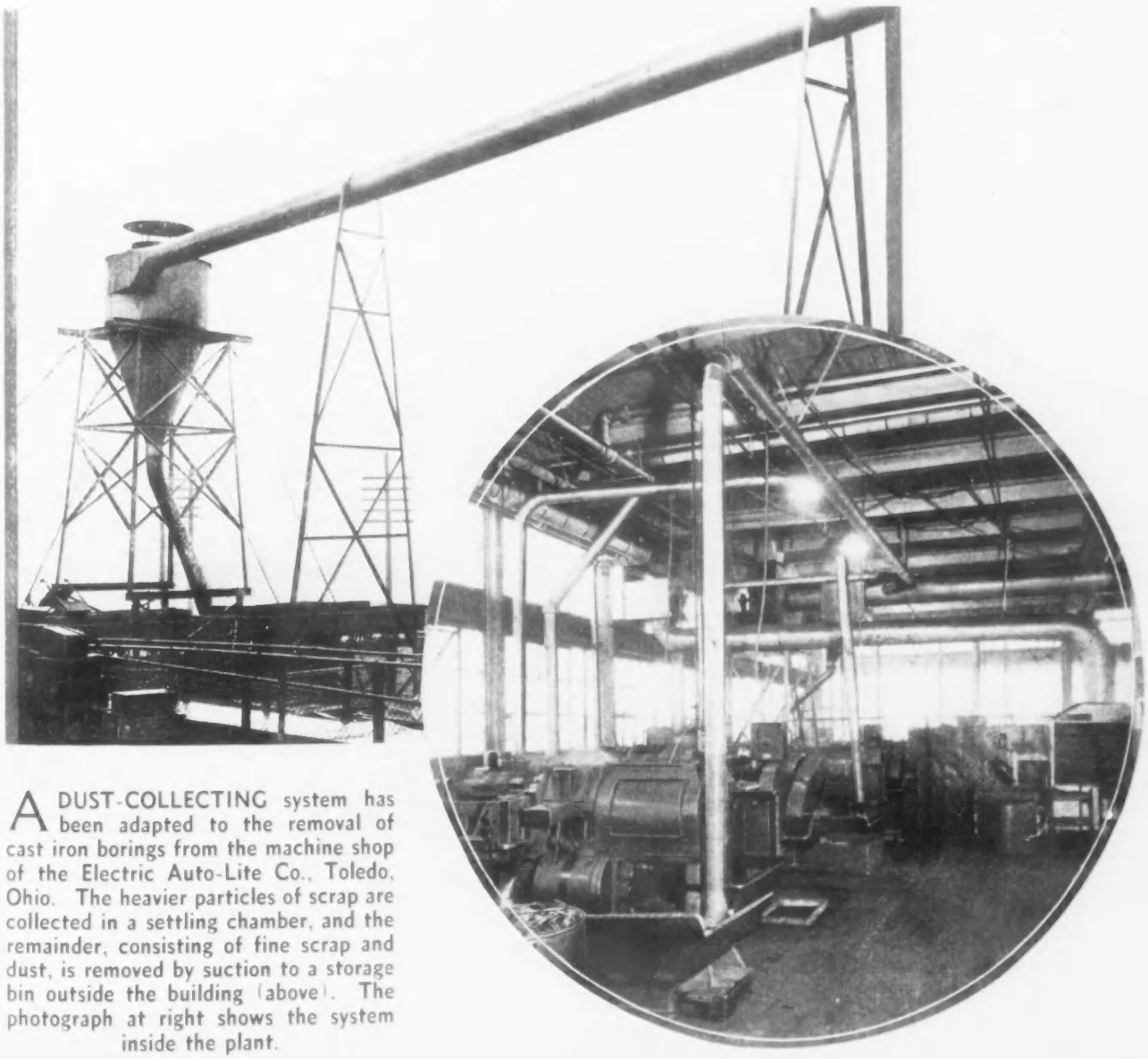
When necessary, it is possible to apply attractive coats of enamels, japans and lacquers to zinc and zinc alloys. Care should be exercised not to use too high a temperature in the baking of enamels and japans to avoid undesirable changes in the physical properties of the casting or rolled zinc part. Special lacquers are being investigated which may prove to have advantages over the ones now in use.

Dust-Collecting System Removes Scrap from Machine Shop

A UNIQUE application of a dust-collecting system for gathering cast iron borings at the machines on which they are produced and delivering this fine scrap to a storage bin outside of the building is found in a recent installation in the plant of the Electric Auto-Lite Co., Toledo.

Another important function of the system is to carry away the fine iron dust that otherwise would get into the bearings and tend to shorten the life of the machines, and also to make working conditions better by keeping the air in the vicinity of the machines clean. This, rather than to remove the scrap, was the main object of the installation.

The system is connected to 19 New Britain and Cleveland multiple-spindle chucking machines, used for machining cast iron heads for starting motors for Ford automobiles, the one factory unit being used exclusively for making these motors and generators for Ford cars. The operations include facing, boring and tapping. The scrap drops from the cutting tools to pans beneath the machines, and a suction system carries away both the scrap and fine dust through a sys-



A DUST-COLLECTING system has been adapted to the removal of cast iron borings from the machine shop of the Electric Auto-Lite Co., Toledo, Ohio. The heavier particles of scrap are collected in a settling chamber, and the remainder, consisting of fine scrap and dust, is removed by suction to a storage bin outside the building (above). The photograph at right shows the system inside the plant.

tem of piping. Connected to each pan is a 5-in. pipe, which leads to one of two branch lines, one 9 in. in diameter and the other 17 in. in diameter. These two lines join in a 22-in. line, which leads to a settling chamber located under the roof inside the building. Passing through a series of baffle plates, the coarser material, about 50 per cent of the total scrap, is collected in the settling chamber and falls to a hopper beneath, at the bottom of which is an automatic dumping device. The material is discharged from the hopper into a pipe, which carries it downward and through the side wall to the outside of the building.

Fine Scrap Blown Through Pipe

The finer scrap and dust are drawn on through the settling chamber and through a 22-in. fan located at the end of the main pipe line, a few feet from the settling chamber. From the fan the material is blown through a line that leads upward through the roof and is carried to a Cyclone dust collector, from which it is discharged into a scrap bin. The heavier scrap is carried to the scrap bin on trucks. The accumulated scrap is loaded from the bin into open cars by means of an overhead crane equipped with a lifting magnet.

The system is arranged with a settling chamber for the reason that the fan would not long withstand the severe service were the heavier particles of scrap drawn through it. The finer scrap is handled by the blower for a distance of approximately 120 ft., that being the distance from the machines to the scrap bin. The amount of air used in operating the system is approximately 9000 cu. ft. per minute. The amount of scrap handled is about 3750 lb. in 8 hr. The saving of labor that would be required for shoveling and wheeling is quite a factor. The system was designed and installed by Northern Blower Co., Cleveland.

Elimination of Sulphur in the Basic Open-Hearth

THE influence of the lime and manganese charged and the amount of lime in the slag on sulphur elimination from 60-ton open-hearth heats has been studied by K. Kobler (*Stahl und Eisen* Sept. 4, 1930). Previous work had shown how sulphur is introduced with the pig iron, scrap and flux, and is absorbed from the gas during the melt down and perhaps during refining. However, opinions differed as to whether manganese or lime played the chief role in desulphurization.

The charge in most of Kobler's tests consisted of 80 per cent foundry scrap and 20 per cent pig iron, and the yield was about 92 per cent. The gas used consisted of two parts of producer gas carrying about 1 lb. sulphur per 10,000 cu. ft. made from a 1 per cent sulphur coal, and one part of a mixture of 35 per cent coke oven gas carrying 4.7 lb. sulphur per 10,000 cu. ft. with 65 per cent of sulphur-free blast furnace gas, the sulphur over all amounting to 1.2 lb. per 10,000 cu. ft. The heats were worked briskly to 0.09 to 0.14 per cent carbon, 0.45 to 0.55 per cent manganese mild steels, tapping a few minutes after manganese addition. Samples of metal and slag were taken periodically.

Records for more than a year failed to show definite relation between the sulphur content of the pig iron charged and that of the finished steel.

When 46 to 62 lb. of sulphur per hour were added as SO_2 to the air supplied, a marked increase in the sulphur content of the metal occurred during the melt down, but there was little absorption during refining. The sulphur content of the slag was not affected.

A sulphur balance on a 58-ton heat, tapped under a slag containing 42 per cent CaO, showed an input of 88 lb. of sulphur, of which 77 per cent came from the scrap, 11 per cent from the pig iron, and 12 per cent from the fuel corresponding to 12 per cent of the total sulphur in the gas admitted to the furnace. Of the sulphur output, 4 per cent went to the gas, 53 per cent to the steel, and 43 per cent to the slag.

The influence of lime was best shown by comparison of the variations in sulphur content of different heats according to the lime contents of their finishing slags. Little desulphurization occurred under slags finishing at 23 per cent CaO but, as the lime was increased, the sulphur drop from the initial 0.055 per cent became more pronounced until, in a heat finishing with a 44 per cent CaO slag, the final sulphur was 0.031 per cent. Curves for the slags show an increasing ability to hold sulphur as the lime content is raised. That the sulphur content of the steel is inversely proportional to the lime content of the slag, and that the sulphur in the slag is directly proportional, may be seen from the table of analyses of samples taken just before tapping.

Desulphurization by Lime

CaO Per Cent (CaO + FeO + MnO = 100 Per Cent)	S in Slag, Per Cent of Total S	Ratio: S in Slag, Per Cent / S in Metal, Per Cent	Desulphurization, Per Cent per Hr.
25.0	30	2.0	0.006
27.0	33	2.0	0.0058
32.0	46	2.5	0.0072
33.6	58	3.0	
35.0	57	4.0	0.0105
37.0	54	6.5	0.0122
40.5	64	9.5	0.0150
42.0	63	8.5	0.0153
44.0	65	7.0	0.0157

The rate of elimination of sulphur is seen to increase with the lime content of the slag, but the curve is apparently tending toward a maximum, owing probably to the influence of lime on slag viscosity, agitation and bath temperature.

A series of seven heats was made in which the manganese charged varied from 0.48 to 1.75 per cent, but no definite relation of manganese content to desulphurization could be observed. Lime deficiency in the slag interfered with the elimination of sulphur even in the presence of high manganese. Low manganese did not influence the desulphurization, which proceeded normally according to the lime content of the slag. With abnormally high manganese in the charge and normal lime, an improvement in desulphurization was detected, but manganese added late in the heat had no effect.

The fact that analysis of the slag shows most of the sulphur to be present as sulphate suggests that it is combined with the lime as calcium sulphate. Laboratory investigation of the reaction of calcium sulphide with ferrous oxide, and the reduction of calcium sulphate by iron would tell more as to the mechanism of desulphurization and as to the form in which sulphur exists in the slag.

Factors Affecting Wire Drawing and Methods of Doing It

By R. R. TATNALL

WIRE drawing is an art very nearly as old as man. Wire was an article of commerce as early as 1700 B.C. It was one of the early industries brought from England to the colonies, and in 1665 it was well established on this side.

In early times the amount of production was very small compared with the tonnage handled today, but in its basic principles the art of wire drawing has changed very little. The advance in recent years is not found in changes in the fundamental process of producing wire, but rather in the mechanical details of its production; i.e., new and faster machinery, etc., any discussion of which is outside the scope of this paper.

Wire drawing has been referred to above as an art, and such it is, because it involves specialized knowledge and practice. One would hardly think of the man in soiled clothes, covered with lime and dust, who may be seen moving bundles of wire about a drawing frame, as an artist. Yet an analysis of the experience he has gained by long toiling hours, of the details of the work he performs and of the results he obtains places him truly in this class.

In making such an analysis of the wire drawer's work, we may confine ourselves to the mechanical operations through which he must go, leaving out most of the operations previous to, or following, the wire drawing in the sequence of fabrication. At the same time it will be necessary to mention a few of these steps, that a clear understanding may be had of what the wire drawer has to deal with.

The purpose of drawing wire is threefold. The first object is to shape a metal into convenient form for use. The second object is to obtain some desired size. The third object, one which makes use of the hardening of metals by cold working, is to obtain increased strength in the metal.

Take such a familiar thing as a pail handle. The most convenient form of the material in this handle is round, while size and strength make no difference, within wide limits. On the other hand, in the case of wire drawn for the manufacture of screws, in addition to the round form, the material must be accurate to size. There are many uses for wires, such as in ropes and cables where strength is of prime importance.

Consequently, it will be seen from these examples, the three purposes of drawing wire are often combined in the requirements for the use of a metal. The reason for drawing, rather than hammering or other method of forming, is economic. Wire drawing is cheap, and is sufficiently accurate and dependable for a host of uses where the cost of material prepared in any other way would be prohibitive. Its cheapness lies in the quantity production which can be obtained, and its dependability comes, as in any other industry, from proper quality control throughout the wire mill.

The most common form of wire is round, the next perhaps being square. Many other shapes, such as triangular, hexagonal and special shapes, are commercially produced by drawing. Sizes vary all the way from wire the size of a human hair (0.003 in.) up to 1 in. or more in diameter. Thus there is a vast field for the application of wire drawing to produce metal in the size, form and properties required by modern industry.

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WIRE is drawn for three purposes: To shape the metal into a convenient form, to obtain a desired size, and to give the metal increased strength. Some of the limitations of this process and how they are neutralized or overcome are detailed here. The work on the metal can reduce its size only a certain amount at a single draft. Successive drafts, after a certain number, require intermediate annealing. So long as the metal is not abused, however, its structure is improved to a considerable degree by the drawing operation.

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Equipment Is Comparatively Simple

A DRAW-BENCH, or frame, for wire drawing, has a number of blocks, the size of which depends on the size of the wire to be drawn. These blocks are provided with a clutch mechanism so that they

may be connected to the main drive and, when so connected, can wind the wire into a coil.

For each block is provided a die-box, which is merely a holder arranged to keep the die and lubricant in proper position. The die is the center of the wire-drawing operation, and will be discussed at length later. This, together with a mechanical means of pointing the wire to start it through the die hole, and a power pull for drawing through a length sufficient to fasten to the block, makes up the wire drawer's equipment.

As received at the wire mill, the raw material is known as rods—hot-rolled metal in the smaller sizes. It is covered with iron oxide scale, and sometimes

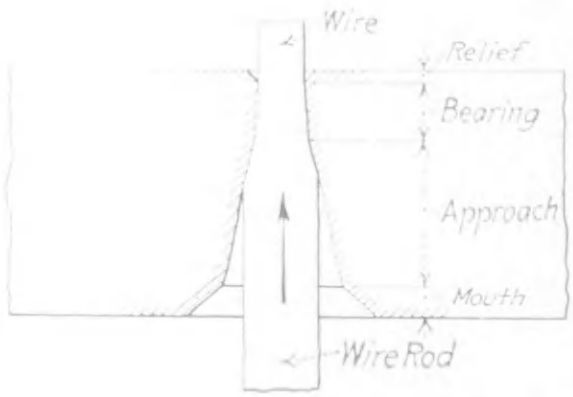


Fig. 1.—Cross-section through a typical wire-drawing die, showing the parts and how they are shaped. The wire rod is pulled through in direction shown by arrow. Of course, after several drafts and in the smaller sizes, the entering piece is no longer a wire rod, but is already a partly drawn wire.

rust, which must be removed by a cleaning process. When delivered to the wire drawer, the rods are covered with lime, under which is the bright, clean surface of the metal. In the early days, the length of a piece of rod was about 15 ft. With present rolling mill practice the rod is produced in a coil containing about 3000 ft.

In operation, wire drawing consists of pulling the metal through a hole smaller than the material at hand. This results in a reduction of the diameter of the material, and a stretching out, or increase, in length. The operation is not so simple as this statement implies, but that is its fundamental characteristic. The successful pulling of a metal through a hole depends on many factors, for its commercial operation, some of which we will analyze further.

The "hole" referred to above is commonly termed the die or whortle, and it is quite complicated when examined closely. Let us first consider the characteristics we would expect to find in this method of shaping a metal. The hole through which the metal is to be pulled must be such that it will make as little friction as possible with the material passing through it. It must impart the desired size uniformly. It must reduce the wire section without tearing the surface and rupturing the metal. In other words, it must make the process of drawing as smooth as possible.

Dies Form the "Heart" of the Process

A SECTION of a die is shown in Fig. 1, with the various characteristics of its shape outlined thereon. The most important points in the die shape are the bearing, both length and diameter, and the approach angle. The bearing diameter is fixed by the desired size of the finished material, as it is that portion of the die that determines the size drawn. The length of the bearing is influenced by the material to be drawn, being in general longer for hard material than for soft, although practice varies a great deal in different mills, and the whole question is a matter of argument and opinion.

Theoretically the bearing is straight, and has no reducing action on the wire. In practice, however, it is slightly tapered, having an included angle of 2 deg. to 3 deg. The approach angle varies between 8 deg. and 12 deg., being governed also by the material to be drawn, soft materials having the larger angle.

So much, then, for the die itself. In the drawing process, the wire drawer mounts the coil of rods on a reel for ready unwinding, and "points" one end. By this means he reduces the size of perhaps a 6-in. length so that it will pass through the die hole. By means of clamping tongs and a power pull he draws through a length sufficient to be attached to the block, which is then set revolving, so that the bundle of rod is drawn continuously through the die.

As the wire enters the die, it strikes the conical portion or approach; and as it is pulled through, it is also forced to a smaller diameter. Through the influence of this tapered approach, a tremendous pressure is exerted on the wire at all points of its sectional area, where the external force on the wire is only sufficient to overcome friction and pull it through. Under this amount of pressure the metal flows and is worked so that, as it reaches the bearing of the die, it has been reduced in diameter to the required size.

The question might be asked, why does not this treatment result in pulling through the center part of the wire and pushing back the outer surface, like pulling a bar through a length of pipe. With correct die shape for the material being drawn, the working due to the pressure induced by the approach of the die is distributed evenly throughout the section of the wire, so that the reduction also takes place evenly throughout the section.

This is illustrated clearly by the micrographs shown in Figs. 2 and 3. Fig. 2 is a photograph—in longitudinal section—of a wire before drawing, and Fig. 3 a photograph of the same wire after drawing. It is evident that the working has taken place throughout the section, as shown by the elongation of the grains of the original metal into fibers.

A consideration of the pressure in the approach of a die will make apparent at once two great problems of wire drawing—first, friction; second, wearing away of the die surface. Friction is, of course, very much in evidence in wire drawing, as

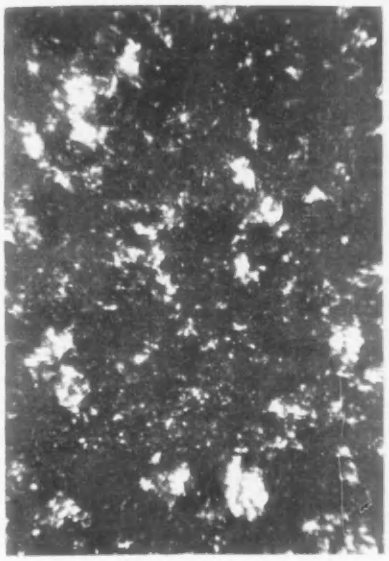


Fig. 2.—Photomicrograph showing structure of wire before drawing. This has been magnified 250 diameters.

would be expected from the nature of the process, and is made apparent by the heat generated while drawing.

Efforts are made to reduce this friction by various methods of lubrication. One of the objects in coating the rods with lime is to provide lubrication in drawing. This lime coat is supplemented by standard mixtures of special soaps, so placed in front of the die that the moving wire will tend to draw the lubricant into the die hole. This lime and soap are almost universally used in all dry drawing and the resulting wire, usually called "bright drawn," really has a thin coating of this mixture drawn into the surface.

In addition to soap and lime, very hard wires are commonly coated with copper, which gives a smoother surface and easier drawing than can be obtained with the use of soap alone. This, of course, leaves the wire with a dull copper finish.

Some classes of wire are drawn wet, either with or without an additional coating of copper or tin. In wet drawing the wire and die are either submerged under a soap solution in water, or the soap solution drips over the die and wire while drawing. All these means are aimed to reduce the friction between the moving wire and the die surface, to lessen the force required to pull the wire through, to reduce the wear on the die and to give a smoother finish on the wire.

Compensating for Effects of Wear

WEAR on the surface of the die takes place at all times, and with all classes of wire drawing. This makes it very difficult to obtain wire which is exact and uniform in size. Ordinarily the wear takes place uniformly around the die, so that the resulting wire remains round while the size increases slightly. Supposing it is desired to draw wire 0.120 in. in diameter, it is common practice to start drawing with a hole that gives a size of 0.1195 in. and average results will give a diameter on the last end of the bundle of 0.1205 in.

Some wire will cut out, as it is termed, more than this amount and some less. For this reason a wire mill must be allowed a tolerance in the sizes produced. The amount a wire will cut out depends on the hardness of the material being drawn, its inherent characteristics regarding this kind of working, the perfection of the cleaning, the type of lubrication, the kind of material from which the die is made and the amount of reduction produced in drawing.

Soft wires will cut out less than hard wires, it being possible to draw about twice as much through one hole of soft wire as of hard. Spots of hard scale, not removed in the cleaning operation will, of course, wear the die rapidly and badly. The material of which the die is made plays an important part in the life of the die.

Chilled cast iron is most commonly used. This provides a hard material which still can be worked quite easily by the proper reamers in preparing the die hole. A tough steel of special analysis is also widely used, hardness being obtained by cold hammering in making up the die shape.

For small sizes of wire diamonds have extensive use, but their application is limited to very small sizes by their high cost. Of late the comparatively new tungsten carbide has been developed for wire drawing purposes, this material approaching the diamond in hardness. The first two mentioned will safely draw not more than one bundle of wire through a hole without resizing, while the last two will draw many bundles, because, due to their hardness, wear is very slow.

Referring to 0.0120-in. wire, a cast iron die will draw about 7500 ft. of wire within size limits. A tungsten carbide die will draw 2,000,000 ft. or more. The amount of reduction made in drawing affects the cutting out of the die in that, contrary to ordinary expectations, small amounts will cause more cutting out than large amounts.

Gages Originated from Reduction Ratios

AMOUNT of reduction permissible in drawing is a subject that deserves some discussion by itself. Wire sizes are commonly given in gage numbers. Unfortunately, there is no universally accepted gage standard. There are a number of gages in use

Fig. 3.—Photomicrograph showing structure of wire after drawing—again magnified 250 diameters.

in this country for different kinds of wire, the one most commonly referred to being "Washburn & Moen."

Gage numbers were originally assigned so that drawing from one size to the next would give the same amount of reduction. For example, drawing from No. 10 to No. 11 gives approximately the same reduction in area as drawing from No. 17 to No. 18, although in the first case the diameter is reduced by 0.0155 in. and in the second case it is reduced by only 0.007 in. The amount of drawing is sometimes referred to in terms of the amount of elongation produced, but more commonly in terms of per cent reduction of area of the cross-section.

When the wire gages were worked out the diameters chosen for the different numbers were such as would give a reduction which was considered practical to draw. This readily accounts for the difference in the wire gages between different manufacturers. Reduction from one gage number to the next gives an area reduction of about 20 per cent. In drawing steel wire it is not practical to give a draft reducing the wire less than about 10 per cent, due, as mentioned above, to the tendency to cut out, nor more than 35 per cent in one draft, due to deleterious effects on the wire itself. Greater reductions may be made with soft material than with hard.

Repeated Drafts with Intermediate Annealing

ONE might ask: How, then, is it possible to produce fine wire, when rods are made in coarse sizes? It is possible because of the fact that the material is not injured by the application of a large amount of reduction, if that application is made in small increments.

It is evident, therefore, that to produce a piece of wire of small size, say 1/16-in diameter, from a rod supplied in 1/4-in. diameter size, a number of dra[ft]s are necessary. It is entirely possible to give a w[ire] three drafts of 20 per cent reduction, or a total [of] 60 per cent, and yet this same 60 per cent cannot be given in one draft.

However, the number of drafts and continuous drawing cannot be carried on indefinitely. There is a limit to the number of drafts a wire will stand, since, like all cold working, wire drawing hardens the material, increases its strength and reduces its ductility. If drawing is continued beyond this limit the wire will become so hard and brittle it will lose some of its strength and will break in drawing.

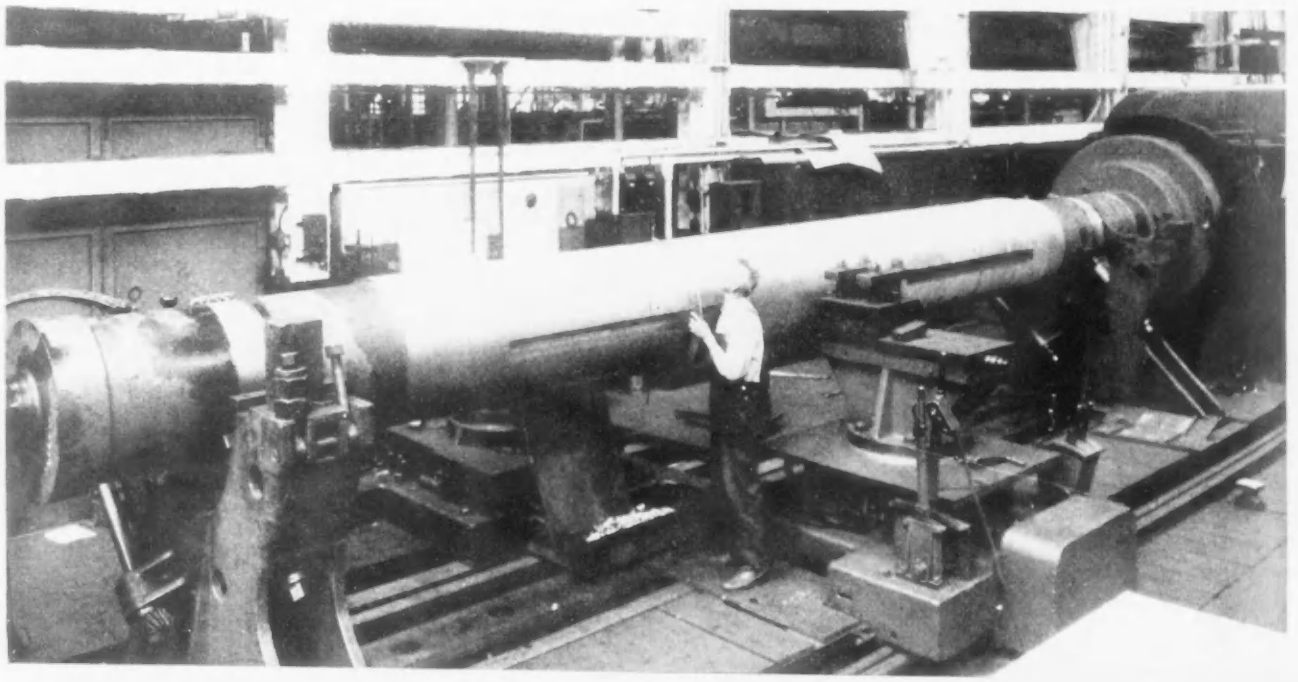
Before this point is reached a separate treatment, known as patenting, must be given the wire. This softens the metal, relieves the strain-hardness, restores the ductility and places the wire in a condition to receive further cold work or drawing.

Lauding the Man at the Bench

IN the foregoing is given a bird's-eye view of the wire-drawing process. To summarize, wire drawing is a process of producing a metal in a desired shape and size, sometimes with definite physical properties, by pulling through a special form of hole from some larger size. The subject of wire drawing is a large one, and every one of the parts discussed here so broadly is a special study in itself. The details of the process are learned only by long experience, and there are many "tricks of the trade," knowledge of which is given only by this experience.

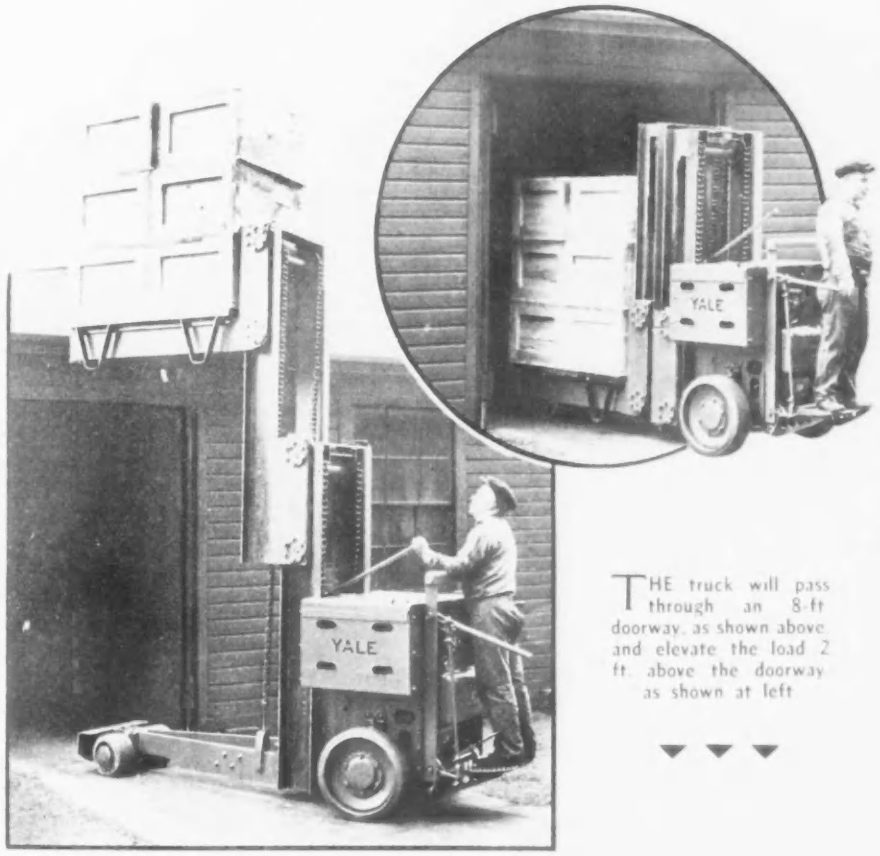
Much of the success of wire drawing depends on the man at the draw bench. While factors beyond his control have important effects, a good man will attain success in drawing a wire where a mediocre man will fail.

THIS 46-ton shaft, one of two built for a double-armature steel mill motor now being turned out by the Westinghouse Electric & Mfg. Co., East Pittsburgh, is thought to be the largest shaft ever made for an industrial application, and one of the largest ever to be machined. It is $34\frac{1}{2}$ ft. long and $31\frac{5}{8}$ in. in diameter, with a flange of 68-in. diameter at one end.



Multi-Lift Truck Used in Warehouse Work

THE Multi-Lift electric elevating platform truck recently placed on the market by the Yale & Towne Mfg. Co., Stamford, Conn., is shown in the accompanying illustration. The use of three of these trucks in the Brooklyn, N. Y., "winter warehouse" of a large chain store company is emphasized as an outstanding example of time, space and labor saving; and is suggestive of how the equipment may be applied to advantage in other industries.



THE truck will pass through an 8-ft doorway, as shown above, and elevate the load 2 ft. above the doorway as shown at left

These 3000-lb. capacity Multi-Lift trucks are 83 in. high overall and have a load platform lift of 113 in., so that the telescopic feature permits a load lift of 30 in. more than the total overall height of the truck uprights when the load platform is lowered. The advantage of this feature is that it permits the truck to go through the average factory or warehouse doorway and enter the average box car, despite the fact that it can elevate the load to a position 30 in. higher than the clearance of either doorway. The company's standard 83-in. overall high-lift truck elevates its load 5 ft., while the Multi-Lift truck will lift its load to almost 10 ft., thus permitting the use of a larger amount of headroom for storage.

Originally the warehouse employed 75 men, who handled the storage work with hand trucks. On three of the four floors given over to storage there is a centralized "selecting area," located directly in front of the elevators. The storage stock is placed at the far end of the building. Both hand lift and electric trucks are used to move the stock from the storage to the selecting area.

Before installing the lift truck system, it was necessary for the selector to travel the entire length of the building in order to obtain the various items that were to be shipped out. Under the new system, the selector's distance of travel has been cut down practically one-fifth. Incoming stock is removed from freight cars by the hand-lift trucks and taken to the elevator either by hand or electric trucks, depending upon the location of the freight car on the siding. The material is then taken to the proper floor for storage. In practically all cases, the storage consists of double tiering.

Bagged flour, formerly double tiered, was stored to a height of 9 ft. Enough bags were stacked on each platform to make up the 9-ft. height when one load was placed upon another. About 90 of these 25-lb. bags are now piled upon a skid and a wood pallet placed on top, making a pile approximately 3 ft. high. Each pallet serves as a rest for the load to be placed above it. By lessening the height of each load, greater stability of the entire pile has been obtained, as well as a perfect alinement of the stock.

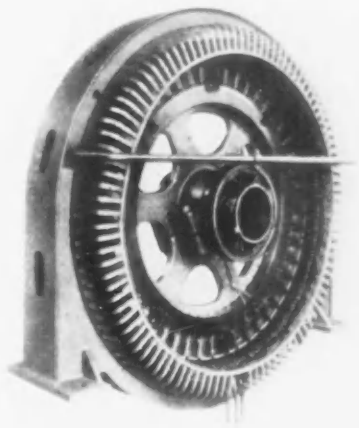
Where formerly all truck loads were single tiered, averaging 4 or 5 ft. high, they are now placed one on top of the other, with 1-in. strips between loads as resting surfaces for the legs of the skids. The average load height is now approximately 10 ft.

The three electric trucks have released 10 men for other duties, and have resulted in a yearly saving of approximately $12,000.

Welded Steel Construction for Stator Frames

ELECTRIC Machinery Mfg. Co., Minneapolis, Minn., announces that arc-welded fabricated steel stator frame construction will now be used for all medium and slow-speed synchronous motors made by this company. A recent change from a two-piece cast iron stator to a welded steel stator for small-size motors completes the changeover to fabricated steel stator frames. This change makes uniform in appearance and general construction the company's entire line of engine-type and coupled pedestal-type synchronous motors.

The box-type stator construction is used for the entire line of E-M slow-speed synchronous motors. This type



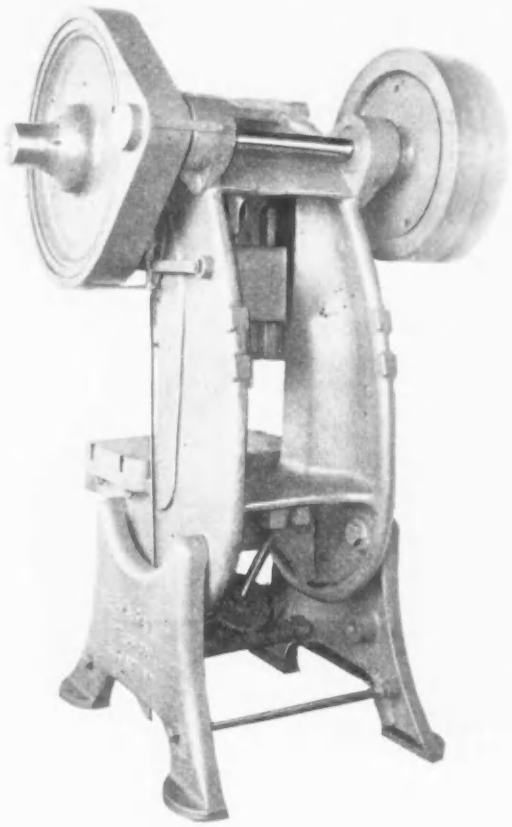
A 125 hp. synchronous motor having an arc welded stator frame

of stator construction is said to give the following advantages: increased strength and rigidity, decreased weight, increased ventilation, more pleasing appearance and uniformity of construction.

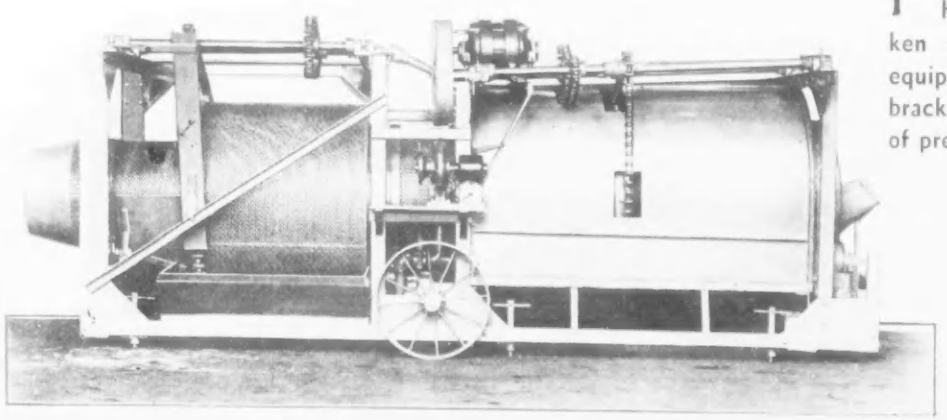
License to manufacture the Dardelet self-locking screw thread has been granted to the W. L. Brubaker & Bros. Co., Millersburg, Pa., and the William H. Ottemiller Co., York, Pa.

Presenting Recent Improvements

PRATT & WHITNEY CO., Hartford, Conn., has introduced a series of seventeen sizes of stub gages for precision boring. These range from $\frac{1}{8}$ in. to 2 in. diameter. A short knurled finger grip is substituted for the usual handle and shortens the gage considerably. This reduces the need for tool clearance in gaging and obviates the introduction of errors caused by the movement of the head of the boring machine. The ordinary quill travel provides sufficient clearance for the use of this new type of gage. Sizes vary by sixteenths up to one-half inch diameter, by eighths to inch and one-half diameter and by quarters to two inch.



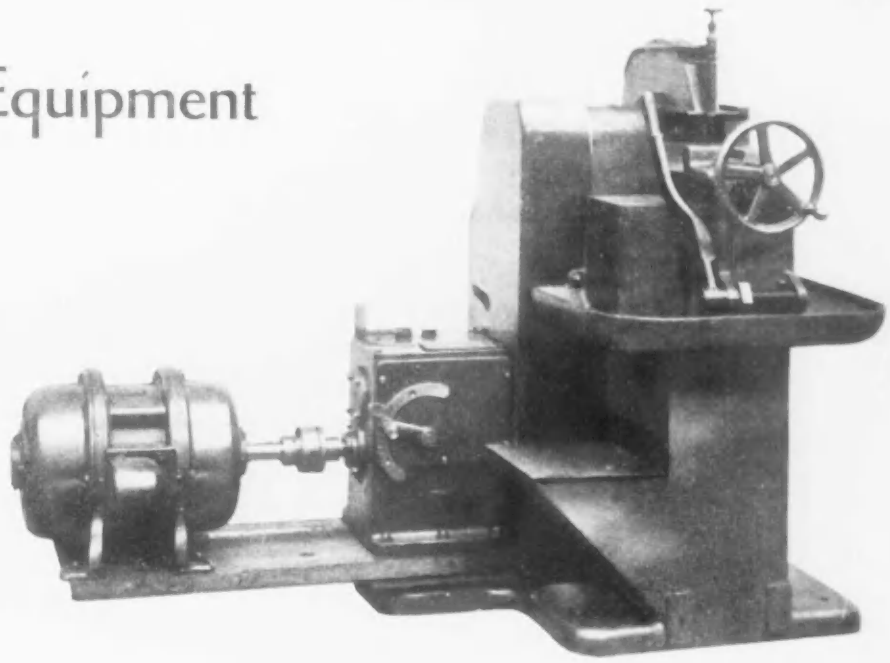
THIS zinc slinger (below) made by N. Ransohoff, Inc., Cincinnati, is designed to eliminate excess zinc and secure uniform protective coatings on zinc coated articles. A gas heated, slanting, hooded barrel, revolving at fifty revolutions per minute, shakes off the excess zinc from the heated parts. They next travel through a perforated drum revolving slowly in water, setting the zinc. Hardware of different shapes with and without threads, and weighing up to fifteen pounds per piece have been handled in this apparatus.

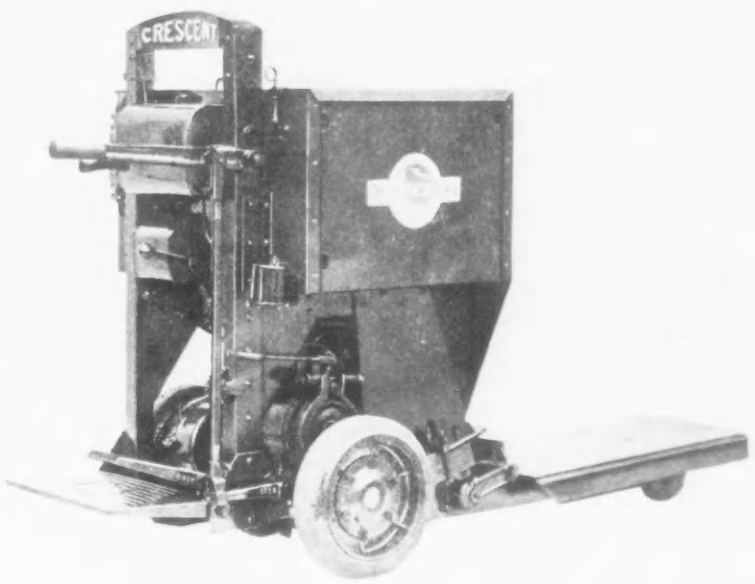


FEDERAL PRESS CO., of Elkhart, Ind., has adopted Timken roller bearings as standard equipment in the back gear brackets on all of their geared type of presses. The bearings are built into adjustable housings, providing for proper gear mesh. Wear is minimized and it is claimed that there is a material saving in power consumption.

in Tools and Equipment

COCHRANE-BLY CO., Rochester, N. Y., recently introduced their No. 21 abrasive cut-off machine illustrated at right. A four-speed gear box provides the proper abrasive wheel speeds of 10,000 to 15,000 ft. per min. and compensates for wheel wear. The machine is designed for either wet or dry cutting and a saw blade can be used for non-ferrous metals, wood, fiber, Bakelite and other materials. The capacity is five inch round stock and the motor required is from 5 to 15 hp.

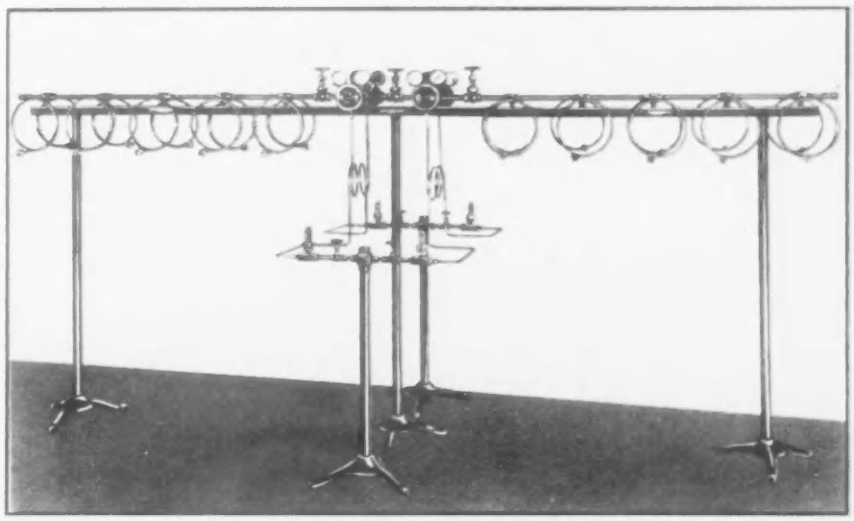


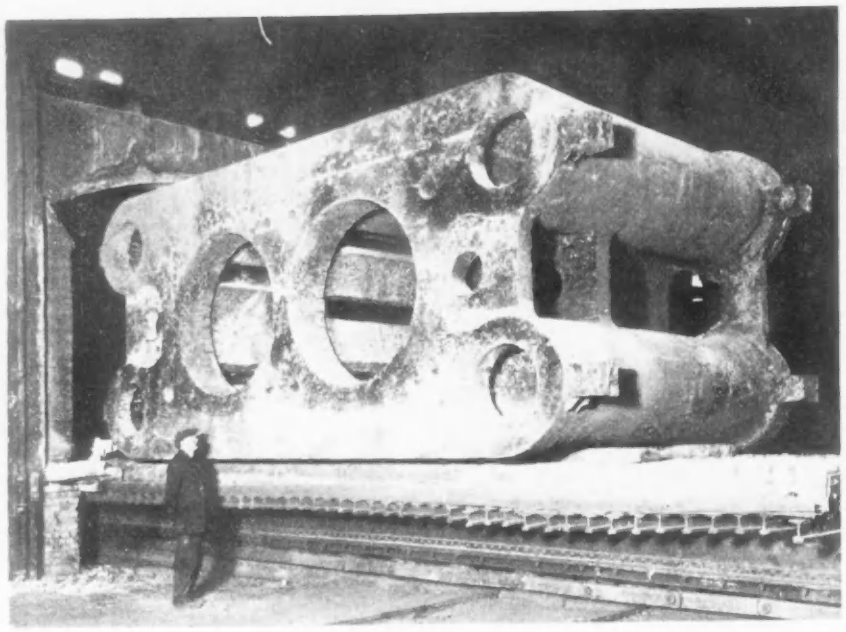


CRESCENT TRUCK CO., of Lebanon, Pa., has developed this new electric industrial power lift truck (left) for use with hand truck platform skids of seven inches high or over. It is designed for service in a field between the larger industrial trucks and the ordinary hand lift trucks. The capacity is 3500 lbs., the lifting platform is 20 in. wide by 40 in. long, and the operating cost of the truck without operator's wages is less than 18 cents per hr. including interest, depreciation, maintenance and battery replacement.

▼ ▼ ▼

ALEXANDER MILBURN CO., Baltimore, Md., is manufacturing twenty-tank manifolds as illustrated (at right). These provide a central source of supply for cutting and welding torches and eliminate the need of transporting cylinders. If desired, each tank or each side of the manifold may be operated independently through separate shut-off valves.





Putting the casting into an annealing furnace.

230-Ton Steel Casting Takes Metal From Six Furnaces

WHAT is believed to be the largest steel casting ever made, having a weight of 460,000 lb., was shown Feb. 16 in the Lehigh plant of the Bethlehem Steel Co., Bethlehem, Pa., to a group of technical editors and newspaper representatives from various sections of the United States. The concluding machining processes were then in operation.

This casting is a platen, or cylinder jacket, for the 14,000-ton forging press of the Bethlehem plant. Up to the present time such devices have been built up of separate parts, because of the technical difficulties involved in casting a single piece of this size. The casting occupies a cube space comparable in size to an old-fashioned drawing room, having a height of 12 ft. 10 in., a length of 23 ft. 4 in., and a width of 10 ft. 2 in.

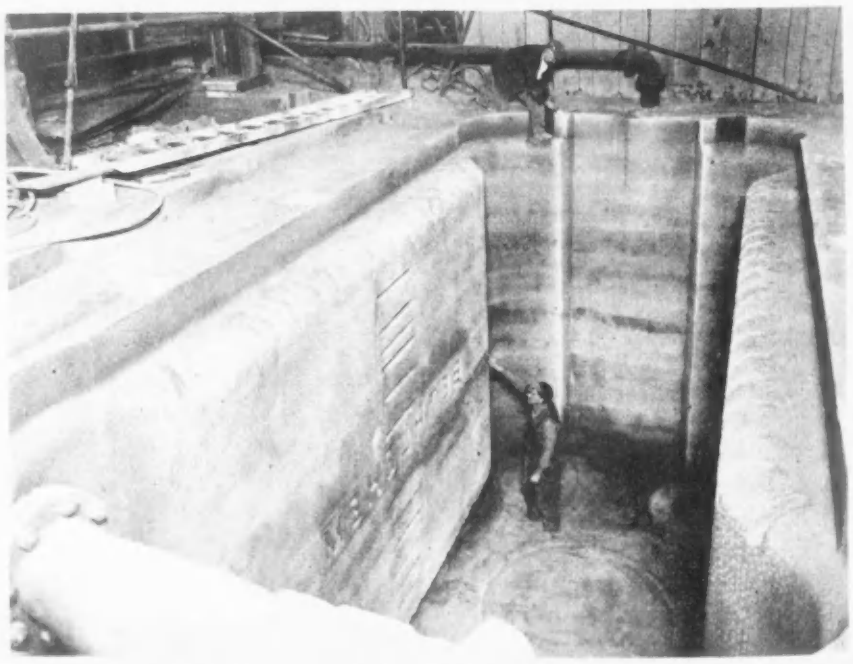
Six open-hearth furnaces were used for melting the required metal. These furnaces are of varying capacity. One of the problems in the job was the difficulty in getting these six furnaces in step so as to be tapped at the proper time. Metal for the casting was poured simultaneously through four different runners, one at each end of the mold and two at the side.

Two of the smaller open-hearth furnaces were tapped into one ladle and the four other furnaces were each tapped into a separate ladle. In this way five ladles of metal were on hand during the pouring, including the standby ladle.

In pouring the casting there was the usual cope, or superstructure, built up to provide space for extra metal for compensating shrinkage. This was arranged for by the customary sinkheads. The standby ladle from the sixth furnace was held back for filling these sinkheads after the pouring of the casting. Two additional gates were put into the casting, midway on its height, and one additional gate in the cope flange of the casting.

Pouring of the casting, exclusive of the heads, was accomplished in approximately 10 min., and the total pouring time, including the heads, was 38 min. Though the pouring of the molten metal is the crucial and most spectacular part of the operation, it was a small fraction of the total job, which has consumed about ten weeks.

Drawings were turned over to the pattern shop on Dec. 3, 1930. The pattern, which had the appearance of a huge packing box, contoured to the design of the desired casting, was delivered to the steel foundry on Dec. 8. The cores for the cylinder barrels were, in effect, solid brick shafts, and were made in three sections, to permit ease in handling. Similarly, the column cores were made in halves. Pattern and core boxes required a



Completing the mold for the hydraulic press platen.

total of 13,060 ft. of lumber and 2000 man-hours of labor.

The mold was made in a large concrete pit, with heavy steel reinforcing over the full surface of the mold. To guard against possible rupture of the concrete pit from the weight and hydrostatic pressure of the molten metal, adjacent pits were filled in and reinforced. The pattern was ready for drawing from the mold on Dec. 13, and, due to its construction and size, this process required an hour.

To provide rapid cooling of the molten metal as it came in contact with the surface of the mold, two tons of nails were used over that surface. Prior to the pouring, it was essential to have the mold thoroughly dry to a depth of 12 in. This required not only hot air, but adequate circulation. An unusual method was used by leading into the mold a pipe fitted with a blower, which circulated dry, heated air from a core oven.

The larger cores, referred to above, weighed approximately 60 tons each. After drying the mold and the cores, the latter were set in the mold, properly secured, and the cope was placed on top, with approximately 1,000,000 lb. of weights to prevent the cores, or columns, from floating in the molten metal during the pouring.

The casting was left in the mold ten days before any cleaning was attempted. After that time the cope

Mold with the cores in place

was removed and the greater portion of the sinkheads were burned off with acetylene. Great care was used in scraping off the mold, to prevent creating conditions which would induce strains in the casting.

On Jan. 23 two 120-ton cranes lifted the casting from the pit and loaded it on to a car for transfer to the forge department, where it was annealed in a large car-bottom annealing furnace. After leaving this furnace it was placed on a specially constructed concrete pad, where six machines were rigged up, one on each of the six holes, for the finishing operations.

A special crane structure has been placed over the forging press on which this casting is to be used. The crane will lift the 460,000 lb. 55 ft. up in the air, to place it in its proper location on the press.

Army and Veterans' Bureau Building Work Under Way

WASHINGTON, Feb. 17.—Army construction amounting to $6,324,000 in New England, New York, New Jersey, Pennsylvania, Maryland and the District of Columbia and 15 hospital construction projects of the United States Veterans' Bureau, totaling $4,507,000 are now under construction, according to reports made to Col. Arthur Woods, chairman of the President's Emergency Committee for Employment. The Army work represents 59 per cent of the total amount of construction in the affected area for which funds have been appropriated. The total Army building program is $29,418,960.

In connection with the building program of the Veterans' Bureau, there are also three projects on which bids are being asked, the total cost of which is estimated at $2,045,000. In addition to these, bids will be advertised for 11 more projects totaling $7,620,000 within the next few months.

The Army work under way is made up as follows by States: Maine, $50,000; Massachusetts, $780,000; New York, $3,116,000, of which the largest projects are cadet barracks at West Point, $825,000; 46 commissioned officers' quarters at Mitchel Field and 28 officers' quarters at West Point, $507,000; New Jersey, $628,000; Pennsylvania, $260,000; Maryland, $300,000, and District of Columbia, $1,190,000, including nurses' quarters, $300,000, and addition to medical school, $840,000.

Army projects not at present under construction, but for which funds totaling $1,687,000 have been appropriated, include $1,332,000 for New York, of which detention barracks at Fort Jay represent $300,000, and hospitals at that fort, $400,000.

Among construction under way for the Veterans' Bureau are the following: Augusta, Ga., building for acute cases, $300,000; Chicago, additional building, $300,000; Somerset Hills, N. J., additional buildings and utilities, $917,000; Bedford, Mass., additional buildings and utilities, $350,000; Knoxville, Iowa, infirmary building, $270,000; Camp Custer, Mich., building for acute cases, $250,000; Gulfport, Miss., additional buildings and utilities, $340,000; Northport, Long Island, additional buildings, $910,000; Memphis, Tenn., additional construction, $400,000; Washington, administration building, $200,000; Perry Point, Md., quarters, $200,000.

Foremanship Training Meetings Held

The National Founders' Association has concluded a series of meetings in the East under the auspices of its committee an industrial education, as a part of its program of foremanship training. One of the meetings was held at Boston on Feb. 11, and another at Newark, N. J., on Feb. 14.

These meetings were addressed by Dr. Harry Myers, Dayton, Ohio, consulting engineer, and by A. B. Lynch and L. W. Olson of the Ohio Brass Co., Mansfield, Ohio.

Trackwork Shipments Somewhat Higher

Shipments of trackwork for T-rail track of 60 lb. and heavier for January are reported by the American Iron and Steel Institute at 5626 net tons. This represents an increase of about 9 per cent over the December total of 5174 tons and is the highest figure since that for September last. It is, however, less than half the total (11,830) tons reported for January, 1930, and is the lowest January figure on record.

Oil-Electric Switching Locomotive

A NEW 60-ton, 360-hp., oil-electric locomotive for yard switching in steel and industrial plants and railroad yards has been developed by the Heisler Locomotive Works, Erie, Pa.

This locomotive is designed especially for high power at switching speeds, and is claimed to be the first self-propelled electric locomotive built with the definite idea of limiting the speed to provide maximum power at comparatively low speeds. The construction employed permits the electrical equipment to develop increased tractive effort at its hourly and continuous ratings. The design also gives high starting adhesion, as all wheels turn together and no pair of drivers may slip.

Two 180-hp. Buda Diesel engines drive two Westinghouse d.c. generators, which in turn supply the current to two traction motors mounted underneath a Commonwealth integral cast steel frame. The traction motors are spur geared to a center drive shaft, which transmits the power through a pair of bevel gears to one axle of each truck. By means of side rods the power is delivered to the other driving wheels. Timken roller bearings are used on the mountings of driving gears.

Universal joints in the drive shaft permit the trucks to swivel freely and make it possible for the locomotive to work on sharp curves. The trucks are of the same basic design as those of the company's steam locomotives. The electrical equipment of the locomotive comprises standard Westinghouse railway apparatus with differential field control.

A feature of the locomotive is that for light work it may be operated by one engine and generator, giving the equipment a better loading and thus obtaining lower fuel consumption.

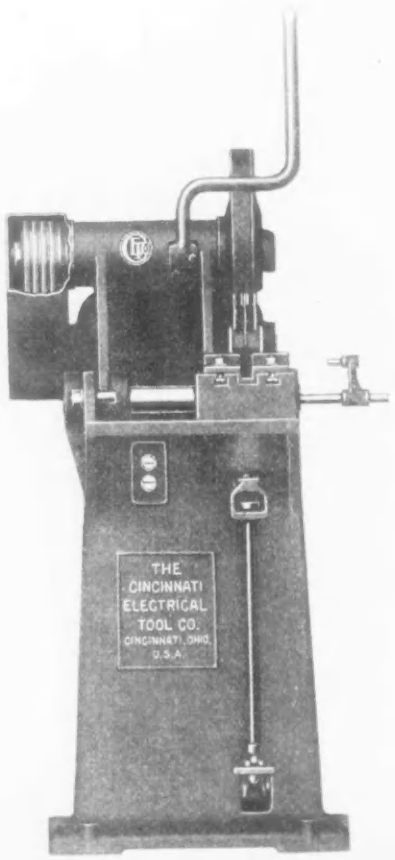
Dynamometer car tests of this 60-ton oil-electric, on level track, are said to show hauling capacity equal to that of a 100-ton steam locomotive—as indicated by the draw-bar pull of 47,800 lb.

Cut-Off Machine Has High Wheel Speed

STEEL, non-ferrous metals and fibrous materials of all kinds, in various sizes, angles and shapes up to 2¼ in. inclusive, may be cut rapidly by means of the high-speed cut-off machine illustrated, which is being marketed by the Cincinnati Electrical Tool Co. division of the R. K. LeBlond Machine Tool Co., Cincinnati. The 12 or 14-in. diameter, 3/32 in. thick, abrasive wheel employed, operates at a peripheral speed of approximately 15,000 to 16,000 ft. per min.

The wheel is completely guarded with the exception of that portion necessary for the cutting operation. Sparks and the abrasive dust are away from the operator through an exhaust connection to a water pan within the pedestal. The machine is powered with a 7½-hp. 3600-r.p.m. inclosed ball-bearing motor, which drives the spindle and cutting wheel through V-belts. The spindle is ball-bearing mounted. The cutting wheel, spindle, wheel and wheel-guard are mounted on a swivel arm which pivots on the pedestal and is balanced by the weight of the motor in the rear.

Straight and angular cuts up to 45 deg. may be made, the same vise being suitable for the various cuts.



The graduations on the table facilitate rapid and accurate angle cutting. Material to be cut is held in the vise by pressure on the foot lever, and the abrasive wheel is moved into the work by means of a hand lever at the front of the machine. No water or other coolant is required. A stop may be set for any depth of cut within the capacity of the machine, while the length of the material to be cut is regulated by a longitudinal stop, which is adjustable to various lengths.

Floor space of 26 x 43½ in. is occupied; the overall height is 60 in. The weight is 1250 lb.

Fastenings in Metal Working

Studies of the forms of screws for fastening metal parts to each other have been made by Parker-Kalon Corpn., 200 Varick Street, New York. These are conveyed in a pamphlet of 24 pages, illustrated, and detailing the type of screws which were found most suitable in more than a dozen specified instances. These cover automobile parts, carbureters, electric refrigerators, metal partitions, fastening of name plates, aircraft, radio sets, toys, switchboard panels, electrical appliances, steel furniture, etc.

We May Bump Along Bottom Before Turning Up

BY DR. LEWIS H. HANEY
DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

HAS the iron and steel industry hit bottom? Whatever doubts there may be concerning the answer to this question, it is at least significant that honest differences of opinion can exist. We find the following points which may be taken to suggest that the bottom has been reached or is very near:

Indications That Bottom Is Reached

(1) Production is far below normal. The average daily output of steel ingots in December was, according to our estimates, 52 per cent of normal and the pig iron output was 56 per cent. These figures are the lowest since September, 1921, and November, 1921, respectively.

(2) The output of iron and steel has been below normal for a period which would usually be long enough to allow the necessary readjustments between demand and supply. Our estimates indicate a below-normal production of pig iron and steel for seven months and eleven months, respectively. In 1920-1921 the subnormal period preceding recovery was about eight months.

(3) The iron and steel outputs, after prolonged declines, have come into close adjustment with one another as judged by their respective percentages of normal production, just as they did in 1921 and 1924 very shortly preceding the bottom.

(4) The adjusted curve of steel ingot production rose more sharply in January than the pig iron curve, which is probably always true in the rebound from bottom levels.

(5) The curve of blast furnace activity rarely reverses itself erratically, particularly in the case of upturns at the bottom, and it rose in January, both as to percentage of the total number of furnaces active and the percentage of capacity.

(6) The P-V line has recovered slightly and moved sidewise or slightly upward during the past few months. While the lag between this barometer and the steel curve is irregular, a sufficient period has elapsed since the P-V line ceased to decline to suggest that a bottom for the steel curve would not be contrary to precedent.

Contrary Indications

On the other hand, certain points may be suggested as indicating that, though the bottom of the recession in steel may be near, some further downward readjustment is to be expected. These are as follows:

(1) Neither the production of pig iron nor that of steel ingots has fallen nearly so far with relation to normal as in July, 1921, when both indexes were a little less than 33 per cent.

(2) Pig iron production has not fallen so low relatively to steel ingot production as it usually does at the bottom of a business cycle.

(3) Neither the iron nor the steel production curve has shown that preliminary tapering off in the recession which usually precedes a sustained recovery.

(4) The January upturns in iron and steel production resemble the "premonitory" upturns which occurred in May, 1921, and which were followed by further declines.

(5) The P-V line is still somewhat below normal, and general business as measured by most of the standard indexes does not make so good a showing as in May, 1921. For example, a sustained expansion in building activity and in automobile production was well under way at the earlier date, and even railroad freight traffic showed a considerable recovery in April, May and June, 1921.

(6) The price structure in the iron and steel industry seems to be imperfectly adjusted: Steel scrap and pig iron are weak and declining, while finished steel prices are nominally holding a small advance. Moreover, THE IRON AGE index of finished steel prices is above its average relation to the general commodity averages as judged by comparisons during any long series of years. For example, the finished steel index is much more than 4¼ times the Bradstreet index, a condition which ordinarily persists only in periods preceding declines in steel prices.

Analogy with 1921 Situation

On the whole, the position of the steel industry closely resembles that found in May, 1921. In both periods we find (1) an abrupt upturn in the production of pig iron and steel ingots, (2) a rising ratio of steel production to the output of pig iron, (3) finished steel prices marked up while pig iron prices sag and the Bradstreet index declines, (4) an advance in the monthly average price of heavy melting steel scrap at Pittsburgh, followed by a decline in the ensuing month.

Of course the analogy is not perfect. For example, unfilled orders were higher in the 1921 period, and so were prices, except in the case of steel scrap. There has been no such rebound in the price of steel sheets as occurred in May, 1921. But on the whole the analogy is strikingly close.

Any attempt to reason from precedent is dangerous, even when confirmed by so many significant measurements as we are able to make in this case. But there may well be some significance in the fact that after May, 1921, the iron and steel production curves did not hit bottom until July, and steel prices did not become finally stabilized until February, 1922. It is at least possible that iron and steel production will show less than the usual seasonal expansion in February and March, and that prices will react when the market is tested by increased buying.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

ESTABLISHED 1855

Unemployment Correctives at Work

THE United States of America in 1931 will have a population closely approximating 125,000,000. About 40 per cent thereof, or 50,000,000, will be rated as workers, capable of gainful employment. About 10,000,000 of that number will be farmers and farm laborers. Of the remaining 40,000,000 about 10,000,000 will be workers in factories, about 3,000,000 will be engaged in transportation, about 1,000,000 in mining, and about 4,000,000 in building. This accounts for about 18 million out of 40. The rest are lumbermen, fishermen, servants, Government employees, professional men and the great class that is engaged in the merchandising and distribution of goods. The last classification includes, of course, the millions who are engaged in garage work and other things associated with the use of automobiles, in the hand trades, which have much to do with repairing and maintenance, and bankers and their employees.

Some reflection in respect to these generalizations may clarify ideas as to the displacement of labor by mechanization. We are getting along with fewer farmers. In transportation there is some curtailment. In mining we probably have about the same personnel as 10 years ago, but with it we produce more ore. More or less the same thing is true of manufacturing. In merchandizing, the chain stores and mail order houses have economized in the use of labor. In comparison with the grand total of 50 million, however, the displacement in all ways has probably been relatively small.

The estimate of unemployment in the United States at the nadir of the depression of 1929-31 is about 5,000,000. This would be 10 per cent of the total of workers or 12.5 per cent of those ex-agricultural. This may, or may not, include the habitually unemployed, who are supposed to be about 2 per cent, or say 1,000,000. Perhaps a good deal of the emotion of the last year has centered around the habitually unemployed, a portion of whom are unwilling to work anyway. Every community has a certain number of that kind. In the small towns, where they are known personally, that is more clearly understood than in the big cities, where bread lines have an impersonality.

The greatest degree of unemployment has been among the builders. Out of their 4,000,000 about 1,500,000 are reckoned as being idle. This correlates with the contraction in building that is shown by the building statistics. The latter exhibit a decline in building for several years back, especially in residential. Such a decline is out of order, for our increase of about 1,800,000 annually in population indicates the need for about 450,000 new houses and apartments. The actual need is more than that, for every year we experience a certain loss by fire and obsolescence. Perhaps we actually need about 500,000 per annum. In recent times our provision of housing has been much less than that.

We may say from observation that the shortage of housing has not caused the American people to live in tents. We may say from deduction that they are living on less floor space per family. Many families are content with that condition, letting the public restaurants be their kitchens and dining rooms and the cinema houses their living rooms; but there are many who are boarding who would like to have houses of their own. They have been prevented by inability to pay for them. The building mechanics have largely strangled their market and produced their own unemployment. In thus behaving they have curtailed the requirements for materials and consequently have induced unemployment among miners, manufacturers and carriers. This may even have an effect upon automobile manufacturing. The suburban home and the automobile have become largely united.

This evil situation shows signs of correction and therein is the greatest encouragement in respect to recovery from our domestic depression. In spite of unions, or the naming of terms otherwise, economic law prevails. With disappearance of demand contractors first became able to select the best men and let the inferior be idle. The best men strained to perform more work in order to hold their jobs. Finally the rejects entered into competition as bootleggers of labor and the union leaders could do nothing else but wink at their infractions of scale. In the end there remains the old scale of wages without meaning, except to the careless buyer who does not shop. What looked like a stranglehold has been broken.

The chief stranglers who remain are the railroad brotherhoods and the anthracite coal miners. They may aggregate about 600,000 workers out of 40,000,000 non-agricultural. They have rendered themselves immune from carpet-baggers and bootleggers, i. e. from competition. They are not immune from substitutional competition, however, and every year that passes increases their unemployment, which is something quite different from the consequences of the economic depression of 1929-31. The price for anthracite coal has not been reduced; in some regions it has been increased. Freight rates and passenger rates remained unchanged. Even now the railroad brotherhoods are meditating some new exactions. When they have made up their minds they probably will get whatever they demand. The railroads will then be stimulated to produce more unemployment among them.

Steel Scrap Awaits Price Rise

IN the last six years steel scrap has declined about one-fourth when valued in terms of finished steel products. The absolute decline has been approximately one-third, but the absolute decline is of minor interest when everything has been declining. The scrap composite of THE IRON AGE, the average of heavy melting steel delivered at Philadelphia, Pittsburgh and Chicago respectively, was $17.12 a ton in 1925 and since the first of the year has averaged $11.27. Dividing the scrap composite by the finished steel composite and adjusting the quotients to make 1925 base, the relationship has been as shown below.

SCRAP RELATIVE TO FINISHED STEEL

1925	100
1926	91
1927	89
1928	87
1929	102
1930	87
Recent	76

The inherent trend must be developed by studying these figures in the light of industrial conditions existing in the respective years. Both 1925 and 1926 were record years in steel production. The increase from one year to the next was greater than the average and, while finished steel prices declined slightly, it would appear that factors depressing scrap prices were stronger. This view is supported by the fact that there were further recessions in the relative in the next two years, one being an off year and the other a year in which new steel producing record was made by a wide margin. That carries the reckoning through 1928. In 1929 there was a sharp rise in the relationship. It would seem that available scrap is more than adequate in ordinary times, but when there is such exceptional steel activity as occurred in 1929 the supply does not altogether rise to the occasion.

In view of the behavior of scrap prices through the year 1928 it is notable that in 1930 there was not a greater decline, for the relationship of scrap to finished steel merely got back to 1928. A reason can be found readily, in the character of activity last year. Dealers found it difficult to secure mill orders for scrap and then found it difficult to get the scrap. There was no little building, but an unusually small portion of it represented replacements. In the matter of freight cars, however, the railroads supplied their due proportion, for while steel production decreased 27 per cent from 1929 to 1930 the number of freight cars retired decreased 28 per cent, practically the same proportion. There may have been a greater decline in other railroad scrap, however.

Of late the condition has been quite different. With all the declines there have been in finished steel prices, scrap has had such a further decline that relative to steel it is much cheaper than last year, and cheaper still, relative to previous years.

As prices go down sources of supply dry up one after another. Some scrap is harder to gather than other scrap and some scrap has to pay very heavy freights to reach points of consumption. In the last few months various sources have dried up. The scrap is there and some time it will be gathered, presumably when there has been a sufficient advance in the market to justify it. Even railroads have been holding back some scrap. On the other hand, there has been a big decrease in exports. In the last three months of 1930 scrap exports amounted to only 31,053 tons, 22 per cent of the rate in 1929, that year having totaled 557,044 tons.

Economies of Operating Rates

WHILE there can be no fixed rule even for a single plant, the opinion has often been expressed that a steel mill finds its most economical operating rate at around 85 per cent. Theoretically, of course, 100 per cent operation would seem to be the most economical, on account of wider distribution of overhead and general running expenses. Practically that has been found not to be the case by those who have compared costs, and who have made allowance for certain results of a very high operating rate that may not appear on the cost sheet compiled at the time. Material may pass mill inspection with necessity later on to make allowance to a customer for inferior quality. Mills are likely to deteriorate more rapidly when run full, necessitating greater repairs afterward, and there are various other considerations.

One could get rid of the apparent anomaly by determining the best operating rate of the plant or department and calling that the true capacity, with any tonnage over that an overload, involving an extra cost which may or may not be justified, according to circumstances. No doubt many manufacturers do have a conception of the matter involving this principle.

When the operating rate goes down, costs mound more and more rapidly, frequently producing surprise if not consternation. There is a disposition to assume that there is something mysterious or at least recondite in the behavior. As a matter of fact, much of what seems strange can be explained mathematically, which means that when one is surprised he has overlooked certain factors by taking a false viewpoint.

Misapprehension may be due to two slips. First, when considering rates of operation one may fail to realize that a drop from a 40 per cent rate to a 30 per cent rate is twice as great in relationship as a drop from 80 per cent to 70 per cent. Second, at 40 per cent the fixed charges per ton are double what they are at 80 per cent. In a loose way it may be said that the number of dollars per ton increase is four times as great in the latter case as in the former. In fact, it is somewhat more than four times as great, because there is an element of progression. With an indefinitely small decrease it would be precisely four times as much. A drop from 40 per cent to 39 per cent makes just a shade more than four times as much addition as a drop from 80 per cent to 79 per cent.

To illustrate by actual figures, take a plant with 100 tons daily capacity. The fixed cost would be so many hundred dollars, but take $100 for convenience. Then there would be $1 a ton at full opera-

tion. At 80 per cent it would be $1.25, while at 70 per cent it would be $1.4286. At 40 per cent it would be $2.50, while at 30 per cent it would be $3.3333. In the decline from an 80 to a 70 per cent operation the rise in fixed cost per ton is 17.86 cents, while in the decline from 40 to 30 per cent the rise is 83.33 cents, or about 4.7 times as much—more than four times, simply because the element of progression enters more in the second case than in the first.

A 10 per cent drop in actual tonnage from an 80 per cent rate means a 72 per cent rate, while from 40 per cent it means 36 per cent, apparently not nearly so much. The increase in fixed cost per ton is t exactly doubled, being one-ninth of $2.50 instead one-ninth of $1.25.

Arithmetic explains by far the greater part the apparently inordinate manner in which costs with declining operating rates. At best the fi cost is many dollars a ton, and the rise grows ma and more rapid as operation goes down. While th may be a percentage rate which is the most econ ical, there is no particular rate below that at whi per ton cost takes a jump. It simply progresses b mathematical rule plus various other influences.

CORRESPONDENCE

Suggests What Is Needed to Restore Prosperity

To the Editor: I have before me your editorial of Jan. 15, "Measuring Time for Recovery." May I suggest, for your consideration, that there can be only one source of prosperity or depression and that is the mental attitude of the common people.

The World War, with its billions of Liberty Loans, taught our people bad habits. The loan sharks, instalment-plan merchants and national advertising have made it easy for these bad habits to enlarge and continue. The people are now up to their ears in debt and have lost their desire to get out.

It will take four years, Mr. Editor, to beat it into the heads of the people that, if they are to have jobs, they must stop buying on the instalment plan.

There are enough good people in the United States who believe that the old principles of thrift and saving are still working to keep business alive, but anyone who thinks 1931 will be a good year is not thinking with neatness and dispatch. At the present time we are raising large sums for the unemployed. Does that money go to buy milk for the children and to pay the grocer? It does not. It goes to take the women to the movies, to buy cigarettes for the men, and to pay for gasoline. To reduce the matter to negotiable English, the common people have as yet not returned to the desire for sound financial principles, and, until this happens, any marked degree of prosperity is impossible.

GEORGE F. SUMMERS.

Davenport, Iowa.

Oil-Hardening Die Steel

To the Editor: Victor F. J. Tlach in a letter which appeared in THE IRON AGE, Dec. 18, 1930, referred to Dr. John A. Mathews's article entitled "Tool Steel Progress in the Twentieth Century," which was published in your issue of Dec. 4.

The history of the development of oil-hardening non-shrinking die steels in the United States is a matter with which the writer is familiar, for he had a part in the development of this type of steel. It was known to me that oil-hardening die steel was made in Sheffield, England, prior to the time it was produced at the Halcomb plant in Syracuse, N. Y. This steel was introduced here at that time by a well-known manufacturer. The original steel was made by the crucible process and the analysis desired was: Carbon 0.85, silicon 0.15 to 0.20, manganese 1.50, and phosphorus and sulphur below 0.03 per cent. The process was continued for some time under the writer's supervision and later the steel was made in the electric furnace, which resulted in a more uniform product.

Some years later at the Halcomb plant the writer was responsible for the development of the superior oil-hardening die steel of the following composition: Carbon 0.90 to 0.95, silicon 0.20 to 0.30, manganese 1.10 to 1.25, chromium 0.45 to 0.55, and tungsten 0.45 to 0.55 per cent, with phosphorus and sulphur 0.02 per cent maximum. The purpose was to produce a denser, stronger and better cutting steel that would anneal and harden more satisfactorily. All these properties were embodied in the improved steel, which is still the most widely used type.

When Dr. Mathews assumed management of the Halcomb Steel Co., before it was acquired by the Crucible Steel Co. of America, the higher manganese type of oil-hardening die steel was made there. Although the writer was associated with Dr. Mathews for many years, the origin of oil-hardening die steel was a subject which was not discussed. It is the writer's belief, however, that it was not Dr. Mathews's intention to deprive foreign manufacturers of any credit that justly belongs to them.

W. B. BROOKFIELD.

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Comment on Poland

T. HOINKO, secretary of the American Polish Chamber of Commerce and Industry, comments upon the article by Charles M. Mills, published in the recent Annual Review Number of THE IRON AGE and entitled "Europe Beset by Economic and Political Unrest." With reference to Mr. Mills' statement that "Poland is a nation of more than 35,000,000, of which only a small percentage can read and write," Mr. Hoinko observes:

"The population of Poland is only about 32,000,000. As a result of the policies of the former rulers of Poland's territories, there is still illiteracy amounting to some 30 per cent. During its ten years as an independent State, however, the Government has succeeded in introducing a very comprehensive system of education. There are now over 4,000,000 children in Polish elementary schools and the number is rapidly increasing."

"Poland is developing rapidly and there is no doubt that in a few more years she will win for herself a place among the leading industrial countries of Europe."

Evidences of Increasing Steel Requirements Accumulate

UPTURN in Automobile Demand, More Pipe Line Business and Gain in Tin Plate Releases Are Features — Ingot Output Now 51 Per Cent of Capacity.

A MORE cheerful tone prevails in the iron and steel industry, both because of further slight expansion in business and more definite promise of larger and more diversified demands with the coming of open weather.

Favorable developments of the week include a spurt in steel buying by the automobile industry, greater tin plate production, more liberal rail and track accessory specifications, the release of pipe line tonnage held up by cold weather, an impressive upturn in sheet orders and a better tone in the wire trade following rather general rains in drought affected agricultural areas.

THE change for the better in automotive steel requirements is so sudden that there is doubt whether it is merely a flash in the pan or marks the beginning of a general recovery in motor car business. Rush shipments of both steel and manufactured automobile parts have been necessary in some instances to round out existing stocks and keep assembly lines moving. The increase in steel demand has thus far been felt chiefly by the Detroit district plant, which is now operating all six of its open-hearth furnaces.

Tin plate specifications continue to improve and tin mill operations for the country now average 70 per cent, with several independents running at 100 per cent. This gain, together with releases of pipe line tonnage, has helped raise Pittsburgh district ingot output to 48 per cent from the 45 per cent level which has prevailed for the past month. A Buffalo independent, benefiting by rail and track supply specifications, is making raw steel at a 75 per cent rate. Steel ingot production for the country at large now averages 51 per cent, compared with 50 per cent a week ago.

VIEWING the steel market as a whole, irregularities in mill operations remain a feature and extreme caution still dominates the policy of buyers. Consumers continue to keep stocks low and to depend on quick shipments from producers, but it is significant that orders are more frequent and, although yet small, are gradually increasing in size.

Conservatism is no doubt holding back the placing of structural steel work and has checked expansion of farm equipment production; yet numerous miscellaneous steel consuming lines are showing steady, if slow, improvement. Releases of sheets, a widely used material in the metal-working industry, have shown the first definite upturn in more than a month, the specifications of the leading producer being the heaviest for any week this year.

THE price situation reflects the uncertainty that frequently characterizes transition periods. Finished steel prices are under pressure and further irregularities have appeared, with actual reductions in a few minor items. Nevertheless the industry is making a strenuous effort to hold the current market and has not given up hope of effecting an advance on plates, shapes and bars.

Sales of wire nails are reported at $1.85 a keg, or a concession of $1 a ton, and galvanized sheets have been shaded a similar amount to 2.85c. a lb. Interest shown in second quarter contracts by sheet buyers has thus far found mills unresponsive, indicating that they are still undecided as to what prices to quote.

Cross currents have created a confusing situation in prices of primary materials. Heavy melting scrap has declined 25c. a ton at Chicago and Detroit, but is stronger in tone, although unchanged in price, at Pittsburgh. A formal reduction of 50c. a ton in Valley pig iron is a belated recognition of a weak market situation which remained largely untested because of a dearth of sales. Domestic fluorspar has broken $1 to $14, mines.

FABRICATED structural steel awards total 14,000 tons, compared with 10,000 tons in the previous week. New projects aggregate 43,000 tons, against 50,000 tons a week ago. In the first eight issues of this year THE IRON AGE has reported a total of 356,000 tons in new projects, compared with 215,000 tons in the same period a year ago. Awards this year total only 189,000 tons, against 289,000 tons in the corresponding part of 1930.

Pipe lines pending include a gas line from Casper, Wyo., into Nebraska, 30,000 tons, which is likely to be placed next week, a Texas gas line requiring 10,000 tons, and a Pacific Gas & Electric Co. project, to run from southern California to Seattle, which calls for 60,000 tons. An extension to the Columbia Gas & Electric Co.'s Eastern gas system, which will take 30,000 tons, may not be awarded until April.

THE IRON AGE pig iron composite, influenced by reductions in the Valleys, has receded from $15.88 to $15.71 a ton, the lowest level since October, 1915. The scrap composite has declined from $11.13 to $11.08 a ton, the lowest point since July, 1921, when it was $11. Finished steel is unchanged at 2.142c. a lb.

PITTSBURGH

Steel Showing More Definite Signs of Improvement—Pig Iron Off 50c. a Ton

Steel business is showing more definite signs of improvement than at any time since mid-January rise in orders.

* * *

Pipe line projects, building construction and tin plate releases loom large in prospective work.

* * *

Steel ingot operations up a few points because of gains at three or four independent plants.

* * *

Valley and Pittsburgh pig iron prices are off 50c. a ton.

* * *

Scrap market has a stronger undertone.

PITTSBURGH, Feb. 17. — With heavier releases on flat-rolled steel products, pipe and reinforcing bars, and with recent sales levels being maintained on other products, the local steel industry shows more definite signs of improvement than it has since the temporary increase in business early in January wore itself out.

A more cheerful tone predominates in the trade, which is attributed partly to the recent rise in security prices, and partly to the added promise of business recovery with the coming of open weather.

New inquiry on heavy construction projects continues to increase, and the release of pipe tonnage held up by colder weather is a concrete manifestation of seasonal influence. Shipments of reinforcing bars are gradually improving, and increased demand for various steel products going to the building industry is reported. Specifications for tin plate continue to mount, and that industry's operating rate has been boosted to 70 per cent of capacity.

Steel ingot operations in the Pittsburgh and nearby districts are not much higher, although small increases by three or four independent companies have boosted the rate two or three points over the 45 per cent level which has prevailed for the last month. While steel production by the leading interest is well maintained, no noticeable improvement is reported. Blast furnace operations are at a standoff, although one independent steel-making stack has gone in, and two Steel Corporation furnaces have been taken out. One of these required relining, and will likely be replaced immediately by another in the same group.

Sheet production is about the same, although recent increases in specifications will be reflected in heavier production before the end of the month. This is assured by the urgent character of recent tonnage coming to the mills. Output of hot-rolled strip is somewhat higher, now averaging about 40 per cent of capacity. Pipe production is just beginning to turn upward, but recent releases of line pipe tonnage will make a considerable difference in the near future.

Steel prices apparently are subject to more pressure, but mills are making strenuous efforts to hold the current market at the so-called stabilization levels established in December. As most of the steel shipped so far this quarter carried lower figures, the real price test will come next month. While talk of advances for second quarter persists, mills will not confirm or deny reports. While higher asking prices adopted in the next few weeks could hardly be expected to apply on second quarter tonnage, they might serve to strengthen present levels sufficiently to drive in business.

In the primary markets mixed trends are in evidence. Valley pig iron, which has been quoted at nominal levels for several weeks, is off 50c. a ton on the basis of offerings by several sellers, while the scrap market has a firmer undertone. Fluorspar has been reduced $1 a ton to $14, mines.

Fluorspar

A large steel company in this district has purchased 2500 tons of fluorspar, its year's requirements, at $14, f.o.b. mines. This establishes the market at the above level, which is a decline of $1 a ton from recent minimum quotations. Most of the large users in the district are already covered for the present year, although purchases have been delayed in some cases because of stocks carried over from old contracts.

Pig Iron

Several sellers of merchant iron have recognized a decline of 50c. a ton in Valley prices, following a long period of pronounced price weakness. Sales of foundry iron have been made in the Valleys and the Pittsburgh district at $16.50, Valley furnace, and malleable and Bessemer have been sold at $17. The market on basic, still untested by tonnage buying, is characterized as nominal at $16.50. The decline is based strictly on small-lot sales, and is prompted more by local competition than by offerings from Cleveland and Southern sellers.

The Pittsburgh district furnace quotations, which are normally carried at 50c. a ton over the Valley, are likewise lower. Shipments of pig iron this month are holding at about the level of January. New buying is light.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$16.50
Bessemer	17.00
Gray forge	16.00
No. 2 foundry	16.50
No. 3 foundry	16.00
Malleable	17.00
Low phos., copper free	$26.66 to 27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross ton f.o.b. Pittsburgh district furnace:

Basic	$17.00
No. 2 foundry	17.00
No. 3 foundry	16.50
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

Semi-Finished Steel

This market is without feature, although one or two companies are reported to have extended old contracts at the prevailing base price of $30 on billets, slabs and sheet bars. Shipments this month are at about the rate that prevailed in January. Small sales of forging billets are bringing $36, Pittsburgh, although the market has not been tested recently on any substantial tonnages. Wire rods are unchanged at $35, Pittsburgh or Cleveland, with practically no new buying reported.

Rails and Track Accessories

The New York, New Haven & Hartford has placed its track accessories among a number of mills, and the inquiry from the Nickel Plate is still pending. The Norfolk & Western is in the market for 3000 kegs of spikes. Specifications are coming in at a normal rate for this time of the year, and mills are fairly well engaged. The operations of the local rail mill are unchanged.

Bars, Plates and Shapes

Buying so far this month has approximated January levels, but the prospective business is much more encouraging, and in some cases specifications are heavier. This is particularly true of reinforcing bars and plates, the latter going principally to railroad car builders and barge yards. The Bessemer & Lake Erie is reported to have placed 1000 hopper cars with a Pittsburgh district car builder.

While structural awards in the immediate Pittsburgh vicinity are no heavier, new work continues to come out, and several projects are pending for the city and State which will

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

	Feb.17, 1931	Feb.10, 1931	Jan.20, 1931	Feb.18, 1930
Pig Iron, Per Gross Ton:				
No. 2 fdy., Philadelphia	$17.76	$17.76	$17.76	$20.76
No. 2, Valley furnace	*16.50*	17.00	17.00	18.50
No. 2 Southern, Cin'ti	14.19	14.19	14.19	17.19
No. 2, Birmingham	13.00	13.00	14.00	14.50
No. 2 foundry, Chicago*	17.50	17.50	17.50	20.00
Basic, del'd eastern Pa.	17.25	17.25	17.25	19.50
Basic, Valley furnace	*16.50*	17.00	17.00	18.50
Valley Bessemer, del'd P'gh	*18.76*	19.26	19.26	20.76
Malleable, Chicago*	17.50	17.50	17.50	20.00
Malleable, Valley	17.00	17.50	17.50	19.00
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	80.00	80.00	80.00	94.00
Rails, Billets, etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	30.00	30.00	30.00	33.00
Sheet bars, Pittsburgh	30.00	30.00	30.00	33.00
Slabs, Pittsburgh	30.00	30.00	30.00	33.00
Forging billets, Pittsburgh	36.00	36.00	36.00	38.00
Wire rods, Pittsburgh	35.00	35.00	35.00	40.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.85
Finished Steel.				
Per Lb. to Large Buyers	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.65	1.65	1.65	1.85
Bars, Chicago	1.70	1.70	1.70	1.95
Bars, Cleveland	1.70	1.70	1.70	1.85
Bars, New York	1.98	1.98	1.98	2.19
Tank plates, Pittsburgh	1.65	1.65	1.65	1.80
Tank plates, Chicago	1.70	1.70	1.70	1.95
Tank plates, New York	1.93	1.93	1.93	2.07½
Structural shapes, Pittsburgh	1.65	1.65	1.65	1.80
Structural shapes, Chicago	1.70	1.70	1.70	1.95
Structural shapes, New York	1.90½	1.90½	1.90½	2.04½
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.55	1.55	1.55	1.80
Cold-rolled strips, Pittsburgh	2.25	2.25	2.25	2.65

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

	Feb.17, 1931	Feb.10, 1931	Jan.20, 1931	Feb.18, 1930
Finished Steel.				
Per Lb. to Large Buyers	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	2.35	2.35	2.35	2.60
Sheets, black, No. 24, Chicago dist. mill	2.45	2.45	2.45	2.75
Sheets, galv., No. 24, P'gh	2.90	2.90	2.90	3.30
Sheets, galv., No. 24, Chicago dist. mill	3.00	3.00	3.00	3.40
Sheets, blue, No. 13, P'gh	2.05	2.05	2.05	2.35
Sheets, blue, No. 13, Chicago dist. mill	2.15	2.15	2.15	2.35
Wire nails, Pittsburgh	1.90	1.90	1.90	2.25
Wire nails, Chicago dist. mill	1.95	1.95	1.95	2.35
Plain wire, Pittsburgh	2.20	2.20	2.20	2.40
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.45
Barbed wire, galv., Pittsburgh	2.65	2.65	2.65	2.95
Barbed wire, galv., Chicago dist. mill	2.60	2.60	2.60	3.00
Tin plate, 100-lb. box, P'gh	$5.00	$5.00	$5.00	$5.25
Old Material, Per Gross Ton				
Heavy melting steel, P'gh	$12.75	$12.75	$13.25	$17.00
Heavy melting steel, Phila.	10.50	10.50	10.50	14.50
Heavy melting steel, Ch'go	10.00	10.12½	10.25	13.50
Carwheels, Chicago	10.50	10.50	10.75	15.00
Carwheels, Philadelphia	13.50	13.50	13.50	15.00
No. 1 cast, Pittsburgh	12.50	12.50	12.50	14.50
No. 1 cast, Philadelphia	11.50	12.00	12.00	15.00
No. 1 cast, Ch'go (net ton)	9.50	9.50	9.50	14.00
No. 1 RR. wrot., Phila.	12.00	12.00	12.00	15.00
No. 1 RR. wrot., Ch'go (net)	8.00	8.00	8.50	13.25
Coke, Connellsville, Per Net Ton at Oven				
Furnace coke, prompt	$2.50	$2.50	$2.50	$2.60
Foundry coke, prompt	3.50	3.50	3.50	3.50
Metals				
Per Lb. to Large Buyers	Cents	Cents	Cents	Cents
Lake copper, New York	**10.12½**	9.87½	10.12½	18.12½
Electrolytic copper, refinery	**9.75**	9.50	9.75	17.75
Tin (Straits), New York	26.00	26.00	25.87½	38.75
Zinc, East St. Louis	4.00	4.05	4.00	5.20
Zinc, New York	4.35	4.40	4.35	5.55
Lead, St. Louis	4.30	4.30	4.55	6.10
Lead, New York	4.50	4.50	4.75	6.25
Antimony (Asiatic), N. Y.	**7.10**	7.05	7.37½	8.75

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

likely be closed in the next month. The foundations for the Pittsburgh Post Office will take 700 to 800 tons of shapes and sheet steel piling.

Demand for bars from automobile makers is no heavier this month than last, although no contraction in shipments is reported. Cold-finishing mills are running at a slightly higher rate, with consequent heavier releases to the hot mills. Buyers are showing more interest in the price structure than they have since the first of the month, and, while no buying is reported to test the market, plates and shapes are admittedly weak. It is indicated that very little tonnage has been taken at more than 1.60c., Pittsburgh, although the asking price continues to be 1.65c. On bars, the higher figure is well maintained on the basis of small orders placed since the first of the year.

Cold-Finished Steel Bars

Demand is holding its own. While from time to time some improvement is noted, it has not been general. Operations continue at 35 to 40 per cent. The 2.10c., Pittsburgh, price is holding on small orders now being placed.

Sheets

Releases last week showed the first definite upturn in more than a month. The leading interest had the heaviest specifications for any week this year, most of which were for immediate shipment. Business was also well distributed among various consuming lines. Some makers, in fact, find that tonnage coming from the automobile industry this month shows less improvement than that from other lines. Michigan business continues spotty, with three or four large interests maintaining high production schedules, and others making very disappointing showings. Orders from the farm implement trade are not benefiting this district to any large extent, but makers of sheet steel building products are steadily increasing their needs, and many other smaller consuming lines are gradually gaining momentum. The leading interest has announced general revisions in width and length extras on galvanized sheets, effective Feb. 16. The revisions are intended to harmonize with changes in black sheet extras last summer. Sheet prices are generally holding, although reductions of $1 and $2 a ton repectively have been recognized on tin mill black plate and long ternes, and galvanized sheets are weak in some districts. Tin mill black is now quoted at 2.55c. to 2.65c., and long ternes at 3.25c. to 3.35c.

Wire Products

Demand for manufacturers' wire is holding up fairly well, although orders from jobbers are very slow. Tonnages involved are also insignificant, and the merchant trade still seems very anxious to keep inventories at a minimum. Recent higher prices on galvanized wire and annealed fence wire seem to be maintained on such business as is coming out, although most users were cov-

THE IRON AGE COMPOSITE PRICES

	Finished Steel	Pig Iron	Steel Scrap
Feb. 17, 1931	2.142c. a Lb.	$15.71 a Gross Ton	$11.08 a Gross Ton
One week ago	2.142c.	15.88	11.13
One month ago	2.142c.	15.90	11.33
One year ago	2.396c.	18.00	15.00
	Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1930	2.562c., Jan. 7;	2.321c., Dec. 9	$18.21, Jan. 7;	$15.90, Dec. 16	$15.00, Feb. 18;	$11.25, Dec. 2
1929	2.412c., April 2;	2.362c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec.
1928	2.391c., Dec. 11;	2.314c., Jan. 3	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July
1927	2.453c., Jan. 4;	2.293c., Oct. 25	19.71, Jan. 4;	17.54, Nov. 1	15.25, Jan. 11;	13.08, Nov.
1926	2.453c., Jan. 6;	2.396c., May 18	21.54, Jan. 5;	19.46, July 13	17.25, Jan. 5;	14.00, June
1925	2.560c., Jan. 6;	2.396c., Aug. 18	22.50, Jan. 13;	18.26, July 7	20.83, Jan. 13;	15.08, May

gered before the price was raised. Nails have been shaded in some districts to $1.85 a keg.

Tin Plate

Releases continue to improve, and the industry is operating this week at better than 70 per cent of capacity. The leading interest is running at over 60 per cent, and several independents continue to report a capacity rate. Consumers in general are releasing specifications at a good rate, and April orders scheduled to come in before Feb. 15 have been very satisfactory.

Strip Steel

Makers are encouraged by the volume of small releases which have come in during the past week, although specifications from the automobile industry reflect little improvement over January. Heavier orders are coming from makers of office equipment, washing machines and steel building products. Operations are slightly heavier with hot mills running at about 40 per cent of capacity and cold-rolling units at 30 per cent. Prices are generally maintained.

Tubular Goods

Heavier releases against old pipe line contracts have been coming to local and nearby mills since the first of the month, and operations are being stepped up slightly. In one case the undelivered remainder of a large order for 22-in. pipe, which originally called for lapweld material, has been changed to electric weld pipe and deliveries will begin immediately. The remainder of the order amounts to approximately 15,000 tons. The North Central Gas Co.'s proposed line from Casper, Wyo., into Nebraska, which will take 30,000 tons of 8, 10, 12 and 14-in. pipe, will likely be placed in the next week. The gasoline-carrying line which the Standard Oil Co. of New York contemplates, to run from Worcester, Mass., to Providence, R. I., is being held up pending franchise arrangements. This line will take 100 miles of 6-in. pipe, or approximately 5000 tons. A gas line in Texas, known as the San Angelo project, will take 40 miles of 8⅝-in. and 78 miles of 12¾-in. pipe, or approximately 10,000 tons. This line is reported as soon to be closed. In California, the Pacific Gas & Electric Co. contemplates a 20-in. gas line to run from the southern part of the State to Seattle, Wash., which will take upward of 60,000 tons. The Columbia Gas & Electric Co. still has approximately 30,000 tons of large diameter gas pipe to place for its Eastern system, which is not likely to be awarded before April.

Several American makers are figuring on a pipe line for Rumania, which will require 14,000 tons. Under the European cartel arrangement, United States mills have an opportunity to bid on only 12 per cent of this project and would also have to accept terms of payment extending over eight years. It is not unlikely that the business will be passed up.

Buttweld pipe makers are stepping up production to some extent, but not rapidly. At present little more than 25 per cent of the country's capacity is being utilized. Seamless units are engaged at a better rate, while lapweld production is considerably lower. Recent gains in demand for mechanical tubing are being maintained, and boiler tubes and locomotive tubing are comparatively active.

Coke

The coke market fails to show improvement, although reports from the foundry trade indicate a more favorable operation in March. Furnace coke is quiet, with prices weak and representing a wide range. Most sellers are still quoting $2.50, Connellsville, but occasional sales are made at considerably less. Domestic coke is holding at recent levels, with weather conditions preventing any large improvement.

Old Material

The scrap market has a stronger undertone, although quoted prices are unchanged. While a small tonnage of railroad heavy melting steel is reported to have been sold at $13.50, the market on ordinary steel scrap is not higher than $13, with practically all dealers willing to sell at that figure. In some cases odd tonnages can be bought by dealers at as low as $12.25. A substantial amount of hydraulic compressed sheets sold during the week brought $12.75 and $13, and a slightly higher price may have been paid. Nevertheless, the market on this grade is hardly as strong as it was last week, and the supply is now more adequate. Sales of bundled sheets have been made at as high as $12, and borings and turnings have brought $8. The other grades of scrap are unchanged.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$12.50 to $13.00
No. 2 heavy melting steel	11.00 to 11.50
Scrap rails	12.50 to 13.00
Compressed sheet steel	12.50 to 13.00
Bundled sheets, sides and ends	11.50 to 12.00
Cast iron carwheels	13.50 to 14.00
Sheet bar crops, ordinary	14.00 to 14.50
Heavy breakable cast	10.50 to 11.00
No. 2 railroad wrought	12.50 to 13.00
Hvy. steel axle turnings	11.00 to 11.50
Machine shop turnings	6.00 to 6.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	16.00 to 16.50
Railr. coil and leaf springs	16.00 to 16.50
Rolled steel wheels	16.00 to 16.50
Low phos. billet and bloom ends	18.00 to 18.50
Low phos. mill plates	16.00 to 16.50
Low phos. light grades	16.00 to 16.50
Low phos. sheet bar crops	16.50 to 17.00
Heavy steel axle turnings	11.00 to 11.50
Electric Furnace Grades:	
Low phos. punchings	15.00 to 16.00
Heavy steel axle turnings	11.00 to 11.50
Blast Furnace Grades:	
Short shoveling steel turnings	7.50 to 8.00
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Rolling Mill Grades:	
Steel car axles	18.00 to 18.50
Cupola Grades:	
No. 1 cast	12.00 to 13.00
Rails 3 ft. and under	14.00 to 14.50

An electric furnace cast iron designated as Grade "A" K/A Alloy has been placed on the market by the Patterson Foundry & Machine Co., East Liverpool, Ohio. This is a highly refined iron and other qualities claimed for it include its high tensile strength, hardness, homogeneity, easy machinability and freedom from blow holes and other defects. Its tensile strength is given at 31,000 lb. per sq. in. and its Brinell hardness at 225 to 275. It is said to have great resistance to abrasion and high resistance to corrosion.

CHICAGO

Ingot Output Gains, But Immediate Outlook Is Clouded

Ingot output up to a range of 48 to 50 per cent, a slight gain for the week.

* * *

Steel releases made up largely of rails, with some lines showing little or no increase.

* * *

Two major outlets, railroad equipment and farm equipment industry, not taking much steel.

* * *

Chicago mills losing automobile business to mills in the Detroit area.

* * *

Heavy melting steel weak, with reduction in the average price.

CHICAGO, Feb. 17.—Although ingot output this week has made a further slight gain to a range of 48 to 50 per cent of capacity for the district, there are some factors that appear to be slowing up progress toward recovery.

It is significant that rail releases constitute a fairly large portion of the increase in specifications in the past week. Some other products are not making a very good showing. Moreover, the Chicago mills are faced with an unfavorable outlook in two of their major consuming lines, the railroad equipment builders and the farm implement industry. There has been no important pickup in building activity, and pipe line manufacture is not taking steel in the quantities that were being shipped at the beginning of the month. Chicago steel companies are also suffering from the fact that mills in the Detroit area are benefiting by increasing automobile production to a greater extent than mills in surrounding territory.

Only two prospects of importance have engaged the attention recently of the railroad equipment trade, one the inquiry from the Milwaukee Road for locomotives and the other the inquiry of the Chicago & Illinois Midland for 800 cars, and in the former case action has been postponed until the middle of March, while the car order has been indefinitely put aside.

Ferroalloys

Several small lots of spiegeleisen have been moved at $30 a ton, furnace. Specifications for ferroalloys have shown very moderate increase in the current month.

Pig Iron

The Northern pig iron market is quiet. Shipments are holding to recent gains and interest in new purchases, some of which are for second quarter, has not receded. There is some question as to the buying movement that may be expected for the second quarter for the reason that quite a few melters are not drawing freely against commitments for the first quarter, and the indications are that there will be a substantial carryover at the end of March. Shipments of pig iron in January exceeded those of December by 35 per cent, whereas the average for the past 10 years has been about 10 per cent. December, 1920, ran ahead of January, 1921, and the next year the two months were about even. Shipments in January, 1923, were about 20 per cent ahead of those of the preceding month. Silvery is moving in small lots. There is evidence that quotations on Southern iron are stiffening.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$17.50
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	27.04
S'th'n No. 2 fdy.	17.51
Low phos. sil. 1 to 2 copper free	$28.50 to 29.20
Silvery, sil. 8 per cent	26.79
Bess. ferrosilicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Warehouse Business

Distribution continues a slow upward movement, having gained only about 5 per cent above the volume moved in the first two weeks in January. However, with the market pointed in the right direction, warehousemen feel encouraged for the reason that March can usually be counted on as one of the best months of the year.

Cast Iron Pipe

Fresh awards include 500 tons of 12 and 16-in. pipe for St. Cloud, Minn., which was divided between James B. Clow & Sons and Central Foundry Co. It is understood here that awards by Detroit of about 130,000 ft. of 6 and 8-in. pipe went to United States Pipe & Foundry Co. and Lynchburg Foundry Co. McWane Cast Iron Pipe Co. has taken 125 tons of 4 and 6-in. pipe for delivery to Wellsburg, Iowa. Among inquiries of note is 2000 tons of 16-in. and smaller diameters for Columbus, Ohio. This market is not as active as it usually is at this time of year. However, in recent days there have been more calls for small tonnages and favorable reports as to projects that are taking shape. Contracting by public utilities is near the end.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $44 to $46; 4-in., $47 to $49; Class A and gas pipe, $5 extra.

Rails and Track Supplies

Railroads are giving the mills releases against rail and track accessory contracts somewhat more freely. So far this has not resulted in an increase in rail operating schedules of 50 per cent. The Illinois Central, which did not place a 1931 rail contract, is specifying against the carryover tonnage from its 1930 contract. The Union Pacific is urging shipments of rails and track supplies. Fully 8000 tons of track fastenings have been placed with Western mills by the New York Central, Burlington and Erie.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, $43; light rails, rolled from billets, $38. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.50c.; steel tie plates, 1.95c.; angle bars, 2.75c.

Bolts, Nuts and Rivets

Specifications for these commodities have shown no gains recently. In fact, the rate thus far in February is little above the average of the last half of January. Individual releases are small.

Hot-Rolled Strip

Releases, especially from automobile frame manufacturers, are expanding. Output at Western mills has gained several points to a range of 35 to 40 per cent of capacity.

Wire Products

Growth of demand in this market is slow but steady. Foremost among recent developments is word from the drought-affected parts of the country that rather general rains are improving the outlook for spring crops. Dealer trade in the Northwest, where conditions appear favorable, is growing. Jobbers are specifying more freely, and the manufacturing trade is gaining headway in the consumption of wire and wire products. Producers, in an effort to maintain stocks, have speeded output several points to a range of 40 to 45 per cent of capacity. The copper wire market is inactive, though there is promise of

betterment as public utilities show signs of releasing against recent contracts. The wire rope market is dull.

Cold-Rolled Strip

Production has been raised a point or two to a range of 30 to 35 per cent of capacity. This is a result of an accumulation of a larger number of small orders. Prices are steady at 2.25c. a lb., Cleveland, or 2.53c., delivered Chicago.

Sheets

Demand has increased for the second week, and output in this district has been raised to an average of 50 per cent of capacity. Orders are widely scattered and are usually for small tonnages, but their number is increasing. Warehouses continue to take small and frequent shipments, but in so doing they reflect a slow growth in distribution. Road programs contemplated and under way point to an exceptionally good year for culvert manufacturers. This is now being reflected by larger specifications from this source. Downspout and gutter manufacturers are also spending output and are taking galvanized sheets more liberally. Prices are steady in the immediate Chicago territory, but to the east, especially at automobile producing centers, concessions are to be had on black sheets.

Base prices per lb., delivd from mill to Chicago: No. 24 black sheets, 2.50c. to 2.60c.; No. 24 galv., 2.90c. to 3.15c.; No. 10 blue (or 20, 2.80c. to 2.75c. Deliv'd prices 30 days. Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Reinforcing Bars

The most encouraging note in this market is an enlarged flow of jobs of 50 tons or less. As a general rule, under conditions that now prevail, this small business turns into actual orders much more readily than do inquiries that call for 100 tons or more. Simultaneously with the upturn in small orders is an influx of new designs of varied character which are giving estimators more to do. Much of this is for public work, which is the backbone of the market at present. The Federal Government, in taking over the completion of the Illinois waterway, finds that most of the reinforcing bars needed had previously been purchased.

Bars

Specifications thus far in February are fully 60 per cent above those of the corresponding period in January, and the tendency toward expansion still exists. Releases in recent days have been about the best of this year. Use of bars for cold finishing is steady, but not of large size. Prices for mild steel bars are 1.70c. to 1.75c. a lb., Chicago.

Gains in demand for alloy steel bars are impressive. Considering the steel market as a whole. This is not reflected in open-hearth output at local mills for the reason that much raw material had been accumulated in recent months. The gain, however, is registered by the output at finishing mills.

The iron bar market is dull, with prices ranging from 1.70c. to 1.75c. a lb., Chicago. Inquiries for rail steel bars show slight improvement, but gains are recorded in releases against old commitments.

Structural Material

February seems destined to pass with little gain in the local building program. Some architects appear to be hopeful that industrial building will soon get under way, but from all outward appearances the mainstay of this market for the present and the near future will be public work.

Plates

Little change has taken place in this market, with the exception that about 1500 tons of oil tankage is now on open inquiry. The railroad equipment market remains quiet except for 1000 tons of repair parts ordered by the Missouri Pacific. There is still much talk about pipe line work, and evidently much of it is being planned, but there are delays due to arrangement of financial matters.

Coke

February shipments of by-product foundry coke show moderate improvement over the rate in January. The price is steady at $8 a ton, local ovens.

Old Material

The Gary mills have taken about 10,000 tons of heavy melting steel at $10.25 a gross ton, and brokers find there is no trouble in covering this tonnage at $9.75 a ton. Accumulations in steel mill yards and the very slow pickup in ingot output are forcing a slow movement of heavy melting steel to consuming points. The Illinois Central recently obtained $10.20 a gross ton, delivered, for heavy melting steel. A central Illinois melter is in the market for 1000 tons of railroad malleable. Inquiries in other directions give some indication that this market may be near a turn.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	2.60c.
Soft steel bars	2.60c.
Reinforcing bars, billet steel	2.60c.
Rail steel reinforcement	2.50c. to 2.75c.
Cold-fin. steel bars and shafting:	
Rounds and hexagons	3.25c.
Flats and squares	3.85c.
Bands ¾ in. (in Nos. 10 and 12 gages)	3.10c.
Hoops (No. 14 gage and lighter)	3.65c.
Black sheets (No. 24)	3.10c.
Galv. sheets (No. 24)	4.35c.
Blue annl'd sheets (No. 10)	3.35c.
Spikes (⅜ in. and larger)	3.45c.
Track bolts	4.30c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60 and 10
Carriage bolts	60 and 10
Coach and lag screws	60 and 10
Hot-pressed nuts, sq., tap, or blank,	60 and 10
Hot-pressed nuts, hex., tap, or blank,	60 and 10
No. 8 black annl'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.35
Cement c'td nails, base per keg	2.30

Prices deliv'd Chicago district consumers, Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel	$9.75 to $10.25
Shoveling steel	9.75 to 10.25
Frogs, switches and guards, cut apart, and misc. rails	9.75 to 10.25
Factory hyd. comp. sheets	8.25 to 8.75
Drop forge flashings	6.75 to 7.25
No. 1 busheling	7.00 to 7.50
Forg'd cast and r'l'd steel carwheels	13.00 to 13.50
Railroad tires, charg. box size	13.00 to 13.50
Railroad leaf springs cut apart	13.00 to 13.50
Axle turnings	8.50 to 9.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	12.00 to 12.50
Coil springs	13.25 to 13.75
Electric Furnace Grades:	
Axle turnings	9.75 to 10.25
Low phos. punchings	11.50 to 12.00
Low phos. plates, 12 in. and under	11.25 to 11.75
Blast Furnace Grades:	
Cast iron borings	4.75 to 5.00
Short shoveling turnings	4.50 to 5.00
Machine shop turnings	4.25 to 4.75
Rolling Mill Grades:	
Iron rails	11.00 to 11.50
Rerolling rails	12.00 to 12.50
Cupola Grades:	
Steel rails, less than 3 ft.	11.50 to 12.00
Steel rails, less than 2 ft.	12.50 to 13.00
Angle bars, steel	11.00 to 11.50
Cast iron carwheels	10.50 to 11.00
Malleable Grades:	
Railroad	11.75 to 12.25
Agricultural	10.75 to 11.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	19.00 to 21.00
*Relaying rails, 65 lb. and heavier	22.00 to 25.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars	10.00 to 10.50
Iron arch bars, and transoms	11.00 to 11.50
Iron car axles	17.00 to 18.00
Steel car axles	12.00 to 12.50
No. 1 railroad wrought	8.00 to 8.50
No. 2 railroad wrought	8.50 to 9.00
No. 1 busheling	6.00 to 6.50
No. 2 busheling	4.00 to 4.50
Locomotive tires, smooth	11.50 to 12.50
Pipes and flues	5.50 to 6.00
Cupola Grades:	
No. 1 machinery cast	9.50 to 10.00
No. 1 railroad cast	8.50 to 9.00
No. 1 agricultural cast	8.00 to 8.50
Stove plate	7.25 to 7.75
Grate bars	7.00 to 7.50
Brake shoes	7.25 to 7.75

*Relaying rails, including angle bars or match, are quoted f.o.b. dealers' yards

Members of the Electric Hoist Manufacturers Association report that the number of hoists ordered during January, 1931, increased 29 per cent, compared with the previous month, and the value of such orders decreased 8.59 per cent, compared with December, 1930. Shipments were 9.85 per cent greater in January, 1931, than they were in December, 1930.

CLEVELAND

Moderate Gains in Steel Orders—Second Quarter Prices Under Consideration

CLEVELAND, Feb. 17.—Specifications for finished steel are coming out in slightly better volume than in January. Although orders are still small, the average size has increased and some consumers are ordering more frequently than recently. Consumers continue to keep their stocks very low and quick shipments usually are called for. Jobbers report quite a gain in orders over those of January. Steel plant operations in Cleveland for the third consecutive week are unchanged at 50 per cent of ingot capacity. The gain in the demand for most products is due largely to the increased activity of the motor car industry. Little new business came from the automobile companies themselves during the week, as most of the motor car manufacturers in the Michigan territory appear to be covered for early requirements.

Consumers are beginning to show an interest in second quarter contracts, and some inquiry for that delivery has come out, mostly for sheets. Sheet mills seem undecided whether they will attempt to get higher prices for the coming quarter and so far have declined to quote for that delivery. Producers of other steel products have not named second quarter prices. While the volume of business in most steel products does not seem to have increased sufficiently to offer encouragement to an advance in prices, it is expected that at least ruling minimum prices will be maintained and that the market will be on a firmer price basis for the coming quarter than it was at the start of the current quarter.

Wire Products

While the recent improvement in orders is being maintained, the stimulation usually caused by seasonal demand is still lacking. Prices are being fairly well maintained. It is expected that present prices will be reaffirmed for the second quarter.

Pig Iron

Sales were light the past week. Buying is mostly in small lots for early needs. Some interest is being taken in the second quarter and a few inquiries have come out for that delivery. Several foundries have made purchases to cover their requirements for the remainder of the present quarter and through the coming quarter. This business was placed at current prices. Orders are not large enough to furnish a test of prices and business is not sufficient in volume to cause a strengthening of the market. Stocks in furnace yards are still heavy. Some furnaces report a gain in shipments over those of January and others are shipping com at about the same rate as last month. Prices are unchanged at a minimum of $16, Lake furnace, for foundry and malleable grades for Ohio and northern Indiana delivery. For delivery in Cleveland and shipment to Michigan $17.50 is the ruling quotation.

Prices per gross ton delivered Cleveland

No. 2 fdy., 1.75-2.25 sil.	$17.50
No. 2 fdy., 2.25-2.75 sil.	$16.51 to 17.01
Malleable	17.50
Ohio silvery, 8 per cent	27.00
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: $50 average local switching charges; $3 from Jackson, Ohio; $6.01 from Birmingham.

Bars, Plates and Shapes

Steel bar orders with some mills show an increase and with others are holding up to the January volume. Most business is coming from makers of automobile parts, although quite a little is being placed by manufacturers of road-making machinery. Activity in the building field has stimulated the demand for structural shapes. However, all good-sized building jobs that had been pending have been placed and new inquiry is very light and no sizable lots are in prospect. Quotations of 1.65c., Cleveland, are still appearing on steel bars, although most mills are holding to 1.70c. The 1.65c., Pittsburgh, price on plates and shapes is being rather generally adhered to for new business, although concessions to 1.60c. are being made in some cases where the buyer is already under contract with another mill at the lower price.

Bolts, Nuts and Rivets

Specifications for bolts and nuts show some gain over those of January, improvement being rather general from automotive and other consuming industries. Demand for rivets is still slack, being no better than last month's. Prices are well maintained.

Sheets

Mills are getting a good number of orders, but they are for small lots for quick delivery. Aggregate volume of business shows little change from the past few weeks, and recent mill operations are being continued. Stove and refrigerator manufacturers are taking a moderate tonnage. Metal furniture sheets are very dull. Specifications from the motor car industry are fairly steady, but do not increase. Prices generally are firm. Pressure for lower quotations appears to be confined to galvanized sheets.

Strip Steel

The recent slight improvement in the demand for hot-rolled strip is being maintained. Orders are coming largely from makers of automobile parts, who are ordering in small lots. Demand for cold-rolled strip, which has been very dull for some time, shows a slight gain. Hot-rolled material is firm at 1.55c., Pittsburgh, for wide and 1.65c. for narrow. Cold-rolled strip is generally quoted at 2.25c., Cleveland, with $2 a ton higher for quite small lots.

Old Material

The market is almost at a standstill. Local mills are accepting no scrap, but Warren, Ohio, is taking heavy melting steel and compressed sheet steel somewhat more freely. Shipments to Youngstown are light. Dealers are buying very little scrap for shipment against contracts. Prices are unchanged and nominal.

Prices per gross ton delivered consumers' mills

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$18.00 to $18.50
No. 2 heavy melting steel	9.50 to 10.00
Compressed sheet steel	9.25 to 9.75
Light bundled sheet stampings	7.50 to 7.75
Drop forge flashings	8.00 to 8.50
Machine shop turnings	4.75 to 5.25
Short shoveling turnings	7.00 to 7.25
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	10.00 to 10.50
No. 1 busheling	8.50 to 9.00
Pipes and flues	5.50 to 6.00
Steel axle turnings	9.50 to 10.00
Acid Open-Hearth Grades	
Low phos., billet, bloom and slab crops	16.50 to 17.00
Blast Furnace Grades	
Cast iron borings	7.25 to 7.50
Mixed borings and steel turnings	7.25 to 7.50
No. 2 busheling	6.50 to 6.75
Cupola Grades	
No. 1 cast	12.00 to 12.50
Railroad grate bars	6.00 to 6.50
Stove plate	6.00 to 6.50
Rails under 2 ft	12.00 to 12.50
Miscellaneous	
Rails for rolling	12.00 to 12.50
Railroad malleable	12.50 to 13.00

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plate and structural shapes	2.55c
Soft steel bars	2.85c
Reinforcing steel bars	2.25c to 2.50c
Cold-fin. rounds and hex.	3.40c
Cold-fin. flats and sq.	3.90c
Hoops and bands, No. 12 to 5/8 in., inclusive	3.10c
Hoops and bands, No. 13 and lighter	3.65c
Cold-finished strip	*3.95c
Black sheets (No. 24)	3.60c
Galvanized sheets (No. 24)	4.35c
Blue annld sheets (No. 10)	3.10c
No. 9 annld wire, per 100 lb.	$2.50
No. 9 galv. wire, per 100 lb.	2.80
Com. wire nails, base per keg	2.25

*Net base, including boxing and cutting to length.

NEW YORK

Steel Gains Irregular—Outlook for Foundry Trade Improves

NEW YORK, Feb. 17.—Actual foundry melt shows little change, but prospects for castings business are brighter and in some instances pig iron shipments have improved. Pig iron sales, at 7500 tons, compare with 9000 tons in the previous week and 5500 tons two weeks ago. The week's bookings, like those of the week before, were swelled by orders for shipment outside of this district. New inquiries are exceedingly light.

The American Locomotive Co. has closed for 100 tons of foundry for its Schenectady, N. Y., plant, and the Worthington Pump & Machinery Corpn. has purchased 100 tons of malleable for Elmwood Place, Ohio, supplementing its recent orders for 250 tons of various grades for that plant and 1100 tons for Buffalo. The Rhode Island Malleable Iron Co., Hillsgrove, R. I., has closed for 1000 tons of malleable for June, July and August delivery. The General Electric Co. has bought against inquiries for its New England plants.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$19.91 to $20.41
*Buff. No. 2, del'd east, N. J.	18.28 to 18.78
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	17.39 to 18.39
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	17.89 to 18.89

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

Finished Steel

It is significant that much of the improvement in the sales totals of steel sales offices in this district has been due to specifications for tin plate and track supplies. There has been a minor gain in orders for bars, but most of the other lines are showing little or no increase. Sheets and strip steel and plates are rather dull.

Companies with diversified products have enjoyed a larger volume of orders this month than in January. However, there is so much irregularity in the demand that disappointment is quite prevalent. The steel trade continues to look forward to better business in March, and some of this expectation is based on actual prospects that have been slow in developing.

Pipe line projects constitute the major portion of the heavy tonnage orders that are in prospect.

Steel prices are fairly steady, though weakness persists in galvanized sheets, and $1.85 has become quite common on wire nails. On bars, plates and shapes, the higher prices named for the first quarter still lack a real test, and some new plate business has been accepted at the 1.70c., Coatesville, Pa., quotation.

The Richmond, Fredericksburg & Potomac Railroad has ordered 3500 tons of 130-lb. rails from Bethlehem Steel Co. to be rolled at Sparrows Point, Md.

Warehouse Business

Buying is in slightly better volume than in January, but considerably below the usual total of February business. Sheet prices are subject to occasional concessions, especially galvanized, on which concessions of $1 a ton from 4c. a lb., base, are sometimes granted on the more desirable lots.

Cast Iron Pipe

Inquiry from municipalities and private users is beginning to improve. Massapequa, N. Y., is inquiring for 30 miles of 6 to 12-in. water pipe, on which bids will be opened Feb. 21, and the Pilgrim State Hospital, Brentwood, N. Y., is in the market for about 2000 tons of water pipe. The Allied Light & Power Co., New York, is inquiring for about 3000 tons of gas pipe and a substantial tonnage of steel pipe for utilities in the Middle West. Medford, Mass., is taking bids on about 100 tons of water pipe and fittings. Pressure pipe prices are unchanged. Northern foundries continuing to quote about $35 a net ton, foundry, with concessions on sizable tonnages for prompt delivery.

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Blue annl'd sheets (No. 10)	3.00c. to 3.25c.
Black sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

No. 28 and lighter, 26 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
⅝ x 20 in. and smaller	65 to 65 and 10

Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

Prices per net ton deliv'd New York:
Water pipe, 6-in. and larger, $37.50 to $38.50; 4-in. and 5-in., $46.90 to $47.90; 3-in., $47.90 to $48.90. Class A pipe, $3 extra.

Reinforcing Bars

Despite the firmer attitude on prices quoted by mills, distributers continue to quote billet steel reinforcing bars at 1.65c. to 1.70c. a lb., Pittsburgh, or 1.98c. to 2.03c., New York. The number of small projects in the market is increasing, and certain large work is swelling the total of pending business. A substantial tonnage of reinforcing steel will be required in extensive highway and bridge construction in Bergen, Morris and Essex Counties, N. J., and the elevated highway over the Passaic and Hackensack Rivers in New Jersey calls for upward of 500 tons of bars.

Coke

Shipments of foundry coke are holding up to the January average, but have not improved. Furnace coke prices range from $2.50 to $2.60 a net ton, Connellsville, and foundry coke quotations follow:

Special brands of beehive foundry coke, $4.70 to $4.85 a net ton, ovens, or $8.41 to $8.56, delivered to northern New Jersey, Jersey City and Newark, and $9.29 to $9.44 to New York and Brooklyn; by-product foundry coke, $9 to $9.40, Newark or Jersey City, $10.06, New York or Brooklyn.

Old Material

Buying prices on No. 1 heavy melting steel are slightly stronger. Brokers who are filling a contract at Bridgeport, Conn., are offering $7.50 a ton, on barge, Brooklyn, for strictly No. 1 steel. For eastern Pennsylvania, brokers are still buying No. 1 steel at $10.50 a ton, delivered, or $7, New York. Other grades of scrap are unchanged in price, but show a slight tendency to weakness.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$7.00 to	$7.50
Heavy melting steel (yard)	5.00 to	5.25
No. 1 hvy. breakable cast	6.75 to	7.25
Stove plate (steel works)	4.75 to	5.00
Locomotive grate bars	4.75 to	5.00
Machine shop turnings		3.50
Short shoveling turnings		3.50
Cast borings (blast fur. or steel works)		3.50
Mixed borings and turnings		3.00
Steel car axles		14.00
Iron car axles	17.50 to	18.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)		7.25
Forge fire		7.00
No. 1 railroad wrought		8.75
No. 1 yard wrought, long		8.75
Rails for rolling	9.25 to	9.75
Stove plate (foundry)	5.50 to	6.00
Malleable cast (railroad)	9.50 to	10.00
Cast borings (chemical)	8.50 to	9.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.); cupola size	10.50
No. 2 cast (radiators, cast boilers, etc.)	10.00

PHILADELPHIA — Some Consumers of Steel Busier—Mill Operations Unchanged

PHILADELPHIA, Feb. 17.—Although some steel consumers in this district, including stove makers and automobile body builders, have been able to increase their manufacturing schedules a little, this has had no appreciable effect on the total volume of steel orders because of the policy of buying in small lots for quick shipment. The operating schedules of radio manufacturers have recently been reduced, but 1931 production programs, to go into effect within the near future, are now being planned.

The Bethlehem Steel Co. is able to operate its plants at an average rate of 54 per cent, but this is largely because of rail business. Other eastern Pennsylvania mills are going along at their recent rate of about 40 per cent.

Except for galvanized sheets, on which concessions of $1 a ton have appeared, steel prices are generally steady.

Pig Iron

Certain foundries in this district, which have had difficulty in operating three and four days a week, have recently been booking enough new contracts to permit working an additional day each week. Demand for foundry pig iron, however, is unchanged, except for occasional requests for shipments of carload lots earlier than originally specified. Eastern Pennsylvania furnaces continue to quote $17 to $17.50 a ton, furnace. Southern pig iron is unchanged at $10.50 to $11 a ton, f.o.b. Birmingham. The Washington Navy Yard is inquiring for 225 tons of low phosphorous iron.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$17.75 to $18.25
East. Pa. No. 2X, 2.25 to 2.75 sil.	18.26 to 18.76
East. Pa. No. 1X	18.76 to 19.26
Basic (del'd east. Pa.)	17.25 to 17.50
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Steel Bars

Buying continues small. Most of the new business is being placed at 1.65c., Pittsburgh, or 1.94c., delivered Philadelphia, with 1.60c., Pittsburgh, or 1.89c., Philadelphia, quoted on the larger and more desirable specifications. While there is a substantial number of reinforced concrete projects in the market, most of this work requires only small tonnages of reinforcing bars. Some of the larger pending construction includes 275 tons of reinforcing bars in a building in Washington for the Standard Oil Co. of New Jersey; 215 tons in a sewer at Norristown, Pa., on which Seeds & Durham, Philadelphia, are low bidders for the general contract, and 140 tons of bars in a building at Ardmore, Pa., for the Ardmore *Times*, on which S. L. Fretz, Philadelphia, is the general contractor. Distributers' quotations on reinforcing bars continue at 1.65c. to 1.70c., Pittsburgh, or 1.94c. to 1.99c., Philadelphia, for billet steel, with rail steel bars at about 1.50c., Franklin, Pa., or 1.79c., Philadelphia.

Shapes

Fabricators are bidding on a number of small projects, but demand for shapes has not increased sufficiently to justify an increase in eastern Pennsylvania mill operations. Where buyers are protected for the first quarter, deliveries of shapes are being made at 1.65c., f.o.b. nearest mill to consumer, or 1.71c., Philadelphia, but on new business the quotation is usually 1.70c., f.o.b. mill, or 1.76c., Philadelphia, except on the larger tonnages.

Plates

Shipyards and structural steel fabricators are contributing small tonnages of plates to eastern Pennsylvania producers, but mill operations are substantially unchanged at about 40 per cent. Prices continue at 1.70c. a lb., Coatesville, Pa., or 1.80½c., Philadelphia, on contracts and on desirable new orders. Small and miscellaneous specifications are usually placed at 1.75c., Coatesville, or 1.85½c., Philadelphia.

Sheets

Black and blue annealed sheets are unchanged in price, but galvanized sheet quotations lack stability. In this district 2.90c., Pittsburgh, or 3.19c., Philadelphia, has been shaded $1 a ton to large users, and recently certain jobbers have offered carload lots of galvanized sheets for shipment direct from the mills at 2.90c., Pittsburgh. Black sheets remain at 2.35c., Pittsburgh, or 2.64c., Philadelphia, and blue annealed sheets, No. 13 gage, at 2.05c., Pittsburgh, or 2.34c., Philadelphia. Blue annealed plates, No. 10 gage, range from 1.75c. to 1.90c., Pittsburgh, or 2.04c. to 2.19c., Philadelphia, the lower quotation applying on business where competition is encountered from the product of the continuous mill. Local consumers of sheets are in certain instances improving their operating schedules, but so far have been only small buyers of sheets. A building in Philadelphia for the United States Marine Corps will require about 200 tons of black and galvanized sheets.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq. twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ⅞-in. inclu.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.60c.
†Galvanized sheets (No. 24)	4.15c.
Light plates, blue annealed (No. 10)	3.05c.
Blue ann'l'd sheets (No. 13)	3.20c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.

†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Imports

In the week ended Feb. 14, 1000 tons of pig iron arrived at this port from British India, and 30 tons of ferromanganese was received from the United Kingdom. Steel imports consisted of 189 tons of structural shapes from Germany and 53 tons from Belgium.

Old Material

No transactions of consequence are reported and prices of all grades are generally unchanged. The maximum price on recent sales of heavy breakable cast scrap has been $11 a ton, delivered. Other grades are inactive.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$10.00 to $11.00
No. 2 heavy melting steel	9.00
Heavy melting steel (yard)	8.50
No. 1 railroad wrought	11.50 to 12.00
Bundled sheets (for steel works)	9.00
Hydraulic compressed, new	9.00 to 10.00
Hydraulic compressed, old	8.00 to 8.50
Machine shop turnings (for steel works)	6.50 to 7.50
Heavy axle turnings (for equiv.)	9.50 to 10.00
Cast borings (for steel works and roll. mill)	7.50
Heavy breakable cast (for steel works)	11.00
Railroad grate bars	9.00
Stove plate (for steel works)	9.00
No. 1 low phos., hvy., 0.04% and under	17.00 to 18.00
Couplers and knuckles	15.50 to 16.00
Rolled steel wheels	15.50 to 16.00
No. 1 blast f'nace scrap	6.50 to 7.00
Wrot. iron and soft steel pipes and tubes (new specific.)	11.50 to 12.00
Shafting	18.00
Steel axles	17.50 to 18.00
No. 1 forge fire	11.00
Cast iron carwheels	13.50 to 14.00
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	12.50 to 13.00

BIRMINGHAM

Pig Iron Prices Still Unsettled—Steel Business Irregular

BIRMINGHAM, Feb. 17.—Unsettled pig iron prices continue. Quotations for No. 2 foundry range from $13 to 13.50, and it is stated that the former figure is at times being shaded. Orders are being placed somewhat more freely, and shipments so far this month by merchant producers are exceeding production. This is due more to replenishing of stocks than to increased melt, most foundries having very little iron on hand.

The Republic Steel Corpn. blew out its No. 2 furnace on Sunday for repairs and replaced it with the No. 1 furnace, which has recently been relined. Republic Steel is operating only one furnace. There were no other changes during the week. The number of active blast furnaces is 11.

Prices per gross ton, f.o.b. Birmingham district furnaces:

No. 2 fdy., 1.75 to 2.25, sil.	$12.00 to $13.50
No. 1 fdy.	13.00 to 14.00
Basic	11.00 to 12.00

Finished Steel

New business is varying from week to week, but with an upward tendency. The tonnage of last week was somewhat less than that of the preceding week. Sheets and wire products are moving fairly well. The beginning of the fence season is bringing a slowly expanding demand.

There are 15 active open hearths, as compared with 16 the previous week. The Tennessee company is operating six at Fairfield, instead of seven, and 318 at Ensley. Gulf States Steel continues with three at Alabama City.

New Orleans is expected to award 2500 tons of reinforcing bars the latter part of this week for a retaining wall and other construction at the airport.

Cast Iron Pipe

Kansas City, Mo., divided 5000 tons among the National Cast Iron Pipe Co., the American Cast Iron Pipe Co. and the United States Pipe & Foundry Co. This was the most important business of the week. On account of a speeding up of municipal improvements, demand from such sources is materializing earlier than usual, and important tonnages are in prospect. Plant operations are around 70 per cent. Base quotations remain at $37 to $38, but are not being maintained firmly.

Coke

Foundry coke market shows little activity. Demand is light and shipments are unimproved. Active by-product coke ovens number 876 out of 1390, but some are on slow coking time. Quotations stand at $5.

Old Material

There is little demand at present, as the mills are out of the market and buying by other consumers is negligible.

Prices per gross ton deliv'd Birmingham district, consumers' yards:

Heavy melting steel	$10.50 to $11.00
Scrap steel rails	10.00
Short shoveling turnings	8.00
Cast iron borings	8.50
Stove plate	8.50
Steel axles	15.00
Iron axles	18.00
No. 1 railroad wrought	10.00
Rails for rolling	11.50 to 12.00
No. 1 cast	11.00
Trimmer wheels	11.00 to 11.50
Cast iron borings, chem.	13.50
Cast iron carwheels	11.00

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c
Bars, soft steel or iron	3.15c
Cold-fin. rounds, shafting, screw stock	3.60c
Black sheets (No. 24)	4.25c
Galv. sheets (No. 24)	5.00c
Blue annealed sheets (No. 10)	3.40c
No. 28 corrug. sheets (No. 24)	4.10c
Galv. corrug. sheets	4.70c
Structural rivets	4.15c
Boiler rivets	4.15c

	Per Cent Off List
Track bolts, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot pressed nuts, sq. blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

ST. LOUIS

Pig Iron Buying Improves—Scrap Market Continues Weak

ST. LOUIS, Feb. 17. Pig iron business is looking up. The St. Louis Gas & Coke Corpn. reports the sale of 7000 tons during the last week in scattered lots and mostly to melters outside of the St. Louis industrial district, and a leading Southern maker has sold about 1000 tons in lots of a carload and more. Business with the commercial foundries shows a slight increase, and they are drawing on their already small stocks. Shipments of the local maker continue heavy. Prices are unchanged and firm. The question of price is much less of a factor in the buying of pig iron than a desire to purchase raw materials of all kinds as orders for finished products are received.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$17.50
Malleable, f.o.b. Granite City	17.50
Nth'n No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd	14.92
Northern malleable, deliv'd	19.66
Northern basic, deliv'd	19.66

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.12 from Birmingham.

Finished Steel

Buying of plates, shapes and bars from mills by manufacturers of steel products in this trade territory continues light, even less than had been expected, and specifications against contracts also are small. Tin plate continues a bright spot. Business is dull with structural fabricators, and no sizable projects are before the market. Sales of reinforcing bars are light. Warehouse business during the last two weeks has been showing a daily increase over the same period in January, with the heaviest movement in plates and bars.

Old Material

Dealers in old material are now reported to have covered themselves fully on the contracts made during the preceding week for about 8000 tons of heavy melting and shoveling steel to an East Side mill. There has been no other buying of consequence since that transaction, and the market is weak and unchanged, except for heavy turnings and wrought iron bars and transoms, which are 50c. lower, and No. 1 railroad cast, which is 25c. off.

Railroad lists: Atchison, Topeka & Santa Fe, 4635 tons; Chicago, Burlington & Quincy, 4405 tons; Missouri-Kansas-Texas, 4100 tons; Louisville & Nashville, 1225 tons; Chicago & Alton, 1200 tons; Illinois Central, 50 carloads; St. Louis-San Francisco, 42 carloads; Chicago & Eastern Illinois, 40 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	$10.50 to $11.00
No. 1 heavy melting or shoveling steel	9.25 to 9.75
No. 2 heavy melting or shoveling steel	9.00 to 9.50
No. 1 locomotive tires	10.75 to 11.00
Misc. stand. sec. rails including frogs, switches and guards, cut apart	10.25 to 10.75
Railroad springs	15.00 to 15.50
Bundled sheets	6.50 to 7.00
No. 2 railroad wrought	9.25 to 9.75
No. 1 busheling	6.75 to 7.25
Cast iron borings and shoveling turnings	6.25 to 6.75
Iron rails	9.50 to 10.00
Rails for rolling	11.00 to 11.50
Machine shop turnings	4.00 to 4.50
Heavy turnings	7.00 to 7.50
Steel car axles	14.50 to 15.00
Iron car axles	20.00 to 20.50
Wrot iron bars and trans.	11.00 to 11.50
No. 1 railroad wrought	10.50 to 11.00
Steel rails, less than 3 ft.	12.00 to 12.50
Steel angle bars	9.50 to 10.00
Cast iron carwheels	10.00 to 10.50
No. 1 machinery cast	9.75 to 10.25
Railroad malleable	10.00 to 10.50
No. 1 railroad cast	9.50 to 10.00
Stove plate	7.50 to 8.00
Relay, rails, 60 lb. and under	16.00 to 16.50
Relay, rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable	9.50 to 10.00

BUFFALO

Bethlehem Steel Co. Increases Operations to 75 Per Cent—Some Scrap Bought

BUFFALO, Feb. 17.—Buffalo pig iron producers during the past week disposed of 3000 to 4000 tons in small lots. There is a dearth of sizable inquiries. Blast furnace operation continues the same and, while reports are that the price is weakening in the East, it is stated that most of the producers are adhering to $15.50 and $16.

Prices per gross ton, f.o.b. furnace

No. 2 fdy., sil. 1.75 to 2.25	$17.50
No. 2X fdy., sil. 2.25 to 2.75	18.00
No. 1 fdy., sil. 2.75 to 3.25	19.00
Malleable, sil. up to 2.25	18.00
Basic	17.50
Lake Superior charcoal	27.28

Finished Steel

The steady increase of operation at the Lackawanna plant of the Bethlehem Steel Co. is to be further augmented this week, when two more open-hearths are to be placed in operation, making 18 in all. This will be the first time that a 75 per cent operation has been reached at this plant in many months. The Donner plant of the Republic Steel Corpn. continues to operate two open-hearths, and Wickwire Spencer two. Gould Coupler is still operating one. The sheet market is spotty, but the Seneca Iron & Steel Co. reports a 50 per cent operation. Announcement of considerable reinforcing bar tonnage is expected by next week.

Old Material

The largest consumer in the district has placed a new order for No. 1 and No. 2 heavy melting steel, the first this year. About 2000 tons was purchased. This concern has inaugurated a different method of purchasing scrap, although the details are not yet completely public. It is reported that the company has named four dealers to supply it with scrap in this district. The consumer intends to do extensive buying of prepared scrap direct from railroads with a view to eliminating dealers' brokerage. It will buy from its dealers only scrap which has been prepared in their yards. The prices made to the dealers on the current order are $11 for No. 1 heavy melting steel and $9.50 for the No. 2 heavy melting steel.

A rather anomalous situation exists in No. 1 heavy melting steel owing to the firm ideas of the railroads in regard to price. Very few lists have come into the open market recently. The railroads are apparently holding out for prices ranging from $13 and $14 for the No. 1 heavy melting steel. It is almost certain that when the miscellaneous scrap in this territory is cleaned up, prices will increase. There is a scarcity of No. 1 cast scrap and stove plate.

Prices per gross ton, f.o.b. Buffalo consumers' plants

Basic-Open-Hearth Grades	
No. 1 heavy melting steel	$10.50 to $11.00
No. 2 heavy melting scrap	9.00 to 9.50
Scrap rails	11.00
Hydraul. comp. sheets	9.00 to 9.50
Hand bundled sheets	8.00 to 8.50
Drop forge flashings	7.00 to 7.50
No. 1 busheling	9.00 to 9.50
Hvy. steel axle turnings	10.00 to 11.00
Machine shop turnings	7.50 to 8.00
No. 1 railroad wrought	9.00 to 9.50
Acid Open-Hearth Grades	
Knuckles and couplers	13.50 to 14.00
Coil and leaf springs	13.50 to 14.00
Rolled steel wheels	13.50 to 14.00
Low phos. billet and bloom ends	14.00 to 14.50
Electric Furnace Grades	
Short shov. steel turnings	12.00 to 12.50
Blast Furnace Grades	
Short mixed borings and turnings	9.00 to 9.50
Cast iron borings	9.00 to 9.50
No. 2 busheling	8.00 to 8.50
Rolling Mill Grades	
Steel car axles	15.00 to 15.50
Iron axles	16.00 to 16.50
Cupola Grades	
No. 1 machinery cast	15.00 to 15.50
Stove plate	9.50 to 10.00
Locomotive grate bars	8.25 to 8.75
Steel axles, 2 ft. and under	15.00 to 15.50
Cast iron carwheels	15.00 to 15.50
Malleable Grades	
Industrial	12.00 to 12.50
Railroad	11.00 to 11.50
Agricultural	11.00 to 11.50
Special Grades	
Charcoal borings	17.00 to 17.50

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.15c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.50c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.60c.
Bands	3.50c.
Hoops	3.90c.
Blue ann'l'd sheets (No. 10)	3.50c.
	Base per Keg
Com. wire nails, base per keg	$2.60
Black wire, base per 100 lb.	3.20

PACIFIC COAST

Upward of 22,000 Tons of Shapes and Concrete Bars Pending

SAN FRANCISCO, Feb. 14 (*By Air Mail.*)—Several large orders were placed during the week, including 3500 tons of structural shapes for the Ford plant in Seattle, secured by the Pacific Coast Steel Corpn., and 2500 tons of plates for a pipe line in Vancouver, B. C., booked by the Vancouver Engineering Works.

Bars

Only two important contracts for reinforcing steel bars are reported. Unnamed interests took 200 tons for a school in Los Angeles and 100 tons for a Government arsenal at Hawthorne, Nev. Bids are being taken on 200 tons for a Federal building in Seattle. Pending business now exceeds 4000 tons. Prices on out-of-stock material in the Los Angeles and San Francisco districts are unchanged at 2.50c., base, on carload lots.

Plates

No action has been taken on 1300 tons for a pipe line at Chelan, Wash. About 100 tons is required for tanks for the Ford plant in Seattle. Prices range from 2.05c. to 2.15c., c.i.f.

Shapes

Among the structural awards were 630 tons for a telephone building in Tacoma, placed with the Wallace Bridge & Structural Steel Co., and 300 tons for a steamer being built in Portland, secured by the Barde Steel Co. Pending work involves more than 18,000 tons. Bids are to be called for at once on 3100 tons for the Commonwealth Building, on 2000 tons for the Lloyd Hotel and on 700 tons for a Federal building, all in Portland. Shapes continue to range from 2.15c. to 2.25c., c.i.f.

Pig iron prices per gross ton at San Francisco

*Utah, fdy., sil. 2.75 to 3.25	$22.00 to $24.00
**Utah, fdy., sil. 2.75 to 3.25	22.00 to 24.00
**Indian, fdy., sil. 2.75 to 3.25	22.00 to 24.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Cast Iron Pipe

The Pacific Water Works Supply Co. has booked 525 tons of 18-in. Class B pipe. French pipe will be furnished. Vancouver, B. C., has opened bids on 1398 tons of 6 and 8-in. Classes C and D pipe. Los Angeles and Long Beach have opened bids on 2270 tons of 6 and 8-in. Class 150 and on 2264 tons of 6 and 20-in. Class B pipe respectively. Edmonds, B. C., will shortly be in the market for 757 tons of 4 to 8-in. Classes C and D pipe.

Track Material

The Western Pacific Co., San Francisco, is taking bids on 10,350 tons of 110-lb. rail. The Southern Pacific Co. has placed with unnamed interests about 1300 tons of track spikes.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.40c.
Black sheets (No. 24)	4.35c.
Blue ann'l'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	4.80c.
Struc. rivets, ½-in. and larger	3.60c.
Com. wire nails, base per keg	$2.75
Cement c't'd nails, 100 lb. keg	2.75

BOSTON

Pig Iron Sales Gain—Cast Scrap Prices Decline $1 to $1.50 a Ton

BOSTON, Feb. 17.—For the second week, pig iron sales have increased. Of about 5600 tons sold the past week, the Mystic Iron Works booked 4800 tons, including 700 tons of malleable iron for the Rhode Island Malleable Iron Co. The Rhode Island company is also reported to have purchased 300 tons from a Buffalo district furnace at $13.73 a ton, delivered, or $15.45 a ton, furnace. Deliveries on current business run from prompt through July. No sizable inquiries have developed, but the Chapman Valve Co., Springfield, Mass., has intimated it may be in the market soon for a round tonnage.

Foundry iron prices per gross ton delivd to east New England points:

*Buffalo, sil. 1.75 to 2.25.. $13.23 to $13.81
*Buffalo, sil. 2.25 to 2.75.. 13.73 to 14.31
*Ala., sil. 1.75 to 2.25.. 21.11 to 21.67
*Ala., sil. 2.25 to 2.75.. 21.67 to 22.11
†Ala., sil. 1.75 to 2.25.. 17.23 to 17.79
†Ala., sil. 2.25 to 2.75.. 17.73 to 18.25

*Freight rates, $1.92 all rail from Buffalo; $1.61 all rail from Alabama and $2.58 all water from Alabama to New England ports.

†All rail rate.

‡Rail and water rate.

Cast Iron Pipe

Only one award, 300 tons of 4, 6 and 8-in. gas pipe, which was divided between two makers by a Massachusetts utility company, was made the past week. The United States Pipe & Foundry Co. was the low American bidder on 1882 tons of 6 to 10-in. pipe and miscellaneous castings required by Pembroke, Mass., and the Warren Foundry & Pipe Co. the low bidder on 500 tons of pipe required by Braintree, Mass., but no awards were made. The 2100 tons wanted by Lowell, Mass., and the 200 tons for Quincy, Mass., are still pending. French pipe interests have been making low prices. Some of the New England utility companies are sounding out the market for 1931 requirements.

Fabricated Steel

The Boston Post Office job is being refigured. The steel involved will, it is believed, total more than 10,000 tons. With business in limited volume, fabricators are making low prices even on small jobs.

Old Material

Prices of textile cast have dropped $1 to $1.50 a ton, with 300 tons going to a Worcester, Mass., textile machinery manufacturer at $9.50 a ton, delivered. No. 1 machinery cast prices have declined $1 a ton in sympathy with textile cast, but no sales were made the past week. The American Steel & Wire Co., Worcester, continues to take small lots of No. 1 heavy melting steel at $9 a ton, delivered, for which dealers are paying $7.10 a ton on a Boston-Worcester freight rate. They are also buying bundled skeleton at $6.10 a ton, shipping point, for Worcester delivery. Buying for New England consumption otherwise is at a standstill, and the movement of material out of New England is quite limited.

Buying prices per gross ton, f.o.b. Boston rail shipping points:

No. 1 heavy melting steel	$6.75 to	$7.[illegible]
Scrap T rails	6.50 to	7.00
Scrap girder rails	5.50 to	6.00
No. 1 railroad wrought	7.00 to	7.50
Machine shop turnings	2.00 to	2.50
Cast iron borings (steel works and rolling mill)	2.00 to	2.50
Bundled skeleton, long	6.00 to	6.50
Forge flashings	5.50 to	6.00
Blast furnace borings and turnings	2.00 to	2.50
Forge scrap	5.25 to	5.75
Shafting	13.00 to	13.50
Steel car axles	14.00 to	15.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	6.50 to	7.00
Rails for rolling	8.50 to	9.00
Cast iron borings, chemical	9.00 to	9.50
No. 2 cast	5.10 to	5.60
Prices per gross ton deliv'd consumers' yards:		
Textile cast	9.00 to	9.50
No. 1 machinery cast	10.50 to	11.00
Stove plate	7.00 to	7.50
Railroad malleable	13.00 to	13.50

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.26½c.
Structural shapes—	
Angles and beams	3.26½c.
Tees	3.26½c.
Zees	3.26½c.
Soft steel bars, small shapes	3.26½c.
Reinforcing bars	3.11½c. to 3.26½c.
Iron bars—	
Refined	3.26½c.
Best refined	4.60c.
Norway round	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Band	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	3.50c. to 5.50c.
Squares and flats	4.00c. to 6.00c.
Tool cast steel	6.00c.
Rivets, structural or boiler	4.80c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts	60 and 5
Cold-punched nuts	60 and 5
Stove bolts	70 and 10

CINCINNATI

Foundry Business Shows Some Improvement—Sheet Steel Demand Steady

CINCINNATI, Feb. 17.—With a slight increase in foundry business, the expectation of the trade for improvement was strengthened. This uptrend, while small, is believed to be the beginning of the frequently predicted gradual market improvement. Sales of pig iron in the week were a little below those of the preceding week, having amounted to 2900 tons. Two Indiana consumers have entered the market, one for 300 tons and the other for 500 tons of Northern foundry iron.

Prices per gross ton, deliv'd Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$14.19 to $14.69
Ala. fdy., sil. 2.25 to 2.75	14.69 to 15.19
Tenn. fdy., sil. 1.75 to 2.25	14.19 to 14.69
S'th'n Ohio silvery, 8 per cent	24.39

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Steel

District manufacturers of sheets report that demand continues at the level that has prevailed for the last four or five weeks. Operations are above 50 per cent. Demand is well diversified. Prices are steady.

Old Material

The scrap market is quiet and featureless. Some material is moving on old commitments, but mills are reluctant to close new contracts. Prices are unchanged.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$10.00 to	$10.50
Scrap rails for melting	10.50 to	11.00
Loose sheet clippings	5.50 to	6.00
Bundled sheets	8.75 to	9.25
Cast iron borings	4.50 to	5.00
Machine shop turnings	5.00 to	5.50
No. 1 busheling	8.00 to	8.50
No. 2 busheling	4.50 to	5.00
Rails for rolling	11.50 to	12.00
No. 1 locomotive tires	11.00 to	11.50
No. 2 railroad wrought	9.50 to	10.00
Short rails	14.75 to	15.25
Cast iron carwheels	10.50 to	11.00
No. 1 machinery cast	14.00 to	14.50
No. 1 railroad cast	12.00 to	12.50
Burnt cast	6.50 to	7.00
Stove plate	6.50 to	7.00
Brake shoes	6.50 to	7.00
Agricultural malleable	12.00 to	12.50
Railroad malleable	13.00 to	13.50

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.35c.
Cold-fin. rounds and hex	3.80c.
Squares	4.30c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	4.20c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (25 kegs or more)	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.	10.25
	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.	$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

Canada

Moderate Improvement Seen in Some Lines

TORONTO, Feb. 17.—The demand for merchant pig iron is well sustained in the Canadian markets. While no large contracts for spot or future delivery were placed during the week, a steady flow of orders ranging from 50 to 200 tons is reported. The betterment in pig iron demand is largely due to the increased demand for castings, car wheels, etc., in connection with rolling stock orders recently placed by the Canadian railways. The Algoma Steel Corpn., Sault Ste. Marie, Ont., has blown in its No. 4 blast furnace, making two active stacks at the Soo. The No. 4 furnace will supply the needs of the rail mill, which will start rolling within a few days. Imports of pig iron, practically all from the United States, are well under the 1000 tons a month. Pig iron prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.10
Malleable	22.80
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	20.50

Structural Steel

Bridge programs are responsible for the bulk of structural steel demand, although it is stated that building work is also showing more activity and some good tonnages are in prospect. The Imperial Bank will erect a new building at King and Bay Streets, Toronto. Steel requirements will be 5000 to 8000 tons.

Old Material

Some improvement in scrap iron sales is reported. Steel grades show little activity. Foundries are the chief buyers, the demand running mostly to machinery cast and malleable grades. The Hamilton mills are virtually out of the market, except when special grades are required. Local dealers look for increased steel scrap buying when the Algoma Steel Corpn. starts up its rail mill. Dealers have made no revision in prices.

Dealers' buying prices for old material:

Per Gross Ton

	Toronto	Montreal
Heavy melting steel	$7.00	$6.00
Rails, scrap	7.00	6.00
No. 1 wrought	6.00	8.00
Machine shop turnings	2.00	2.00
Boiler plate	7.00	8.50
Heavy axle turnings	8.50	9.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axles, wrought iron	7.00	11.00
No. 1 machinery cast		10.00
Stove plate		8.00
Standard carwheels		8.50
Malleable		8.00

Per Net Ton

No. 1 mach'ry cast	11.00	...
Stove plate	8.00	...
Standard carwheels	10.00	...
Malleable scrap	9.00	...

Youngstown

Mills Averaging 50 Per Cent; Look for Gain in March

YOUNGSTOWN, Feb. 17.—For the third week in February, steel companies continue operations at an average rate of 50 per cent. Steelmaking is at the highest rate since last June, with 30 of 51 independent open-hearth furnaces melting, due largely to the increased demands for steel for electric welding pipe mills and sheet mills. Bessemer steel production is not keeping pace with the improved activities in the open-hearth division. Following a gain in its schedules last week, the Republic Steel Corpn. reports another slight increase this week.

Steel makers expect to continue schedules at 50 per cent this month, but look for another upward movement in steel production in March.

That difficulties are being encountered in supporting a 50 per cent production rate is indicated by the downward revision of the Youngstown Sheet & Tube Co. schedules to a 40 per cent basis. New tonnages are not coming forward at the rate anticipated by the industry, but the immediate future is promising for the release of more flat-rolled steel business.

Westinghouse Electric Co. Goes on Five-Day Week

Effective March 1, all the works and offices of the Westinghouse Electric & Mfg. Co., East Pittsburgh, will omit Saturday operations, except as involved in maintaining adequate service with customers and others with whom the company does business. According to an announcement by F. A. Merrick, president, the plan to be followed for the immediate future is to shorten the working week to the extent represented by the work normally required on Saturday throughout the company.

As this reduction of service represents approximately 10 per cent, that amount of reduction will apply to all salaried employees. Similar arrangements have already been put into effect as to employees on an hourly basis. Mr. Merrick emphasizes the fact that this arrangement is solely an emergency measure to spread the work through this period of severe business depression and that normal arrangements will be reinstated with the advent of normal times.

MOTOR TRUCK TRAVELS BY EITHER ROAD OR RAIL

AN experiment in transportation of considerable interest is being made in England, where a railroad has developed a motor truck that travels either on the road or on rails. When used for rail travel, the motor truck can be attached to a passenger train, as it is fitted with flanged rail wheels. On the outside of these are pneumatic tired road wheels which are mounted on eccentrics. To change over from rail to road service, 2½ minutes was required under test conditions.

▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

Mill Prices of Semi-Finished Steel

Billets and Blooms

Per Gross Ton

Rerolling, 4-in. and under 10-in., Pittsburgh $30.00
Rerolling, 4-in. and under 10-in., Youngstown 30.00
Rerolling, 4-in. and under 10-in., Cleveland 30.00
Rerolling, 4-in. and under 10-in., Chicago 32.00
Forging, Pittsburgh 36.00

Sheet Bars

(Open Hearth or Bessemer)

Per Gross Ton

Pittsburgh $30.00
Youngstown 30.00
Cleveland 30.00

Slabs

(4 in. x 2 in. and under 10 in. x 10 in.)

Per Gross Ton

Pittsburgh $30.00
Youngstown 30.00
Cleveland 30.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

Per Lb.

Grooved ..... 1.60c.
Universal ..... 1.60c.
Sheared ..... 1.60c.

Wire Rods

(Common soft, base)

Per Gross Ton

Pittsburgh $35.00
Cleveland 35.00
Chicago 36.00

Prices of Raw Material

Ores

Per Unit

Old range Bessemer, 51.50% iron $4.80
Old range nonBessemer, 51.50% iron 4.65
Mesabi Bessemer, 51.50% iron 4.65
Mesabi nonBessemer, 51.50% iron 4.50
High phosphorus, 51.50% iron 4.40

Per Unit

Foreign Ores, c.i.f. Philadelphia or Baltimore

From ore low phos., copper free, 55% to 58% iron, in dry Spanish or Algerian ore, 10 to 90c.
Iron ore, low phos., Swedish, average 65% iron ..... 10.00c.
Iron ore, Tunisian, basis, Swedish, average 65% iron ..... 9.00c.
Manganese ore, washed 52% manganese, from the Caucasus ..... 25c. to 27c.
Manganese ore, African or Indian, 50 to 52% ..... 24c. to 26c.
Manganese ore, Brazilian, 46 to 48% ..... 22c. to 24c.
Tungsten ore, high grade, per unit, in 60% concentrates ..... $12.00 to $12.25

Per Gross Ton

Chrome ore, 48% Cr.O. crude, c.i.f. Atlantic seaboard $26.00
Chrome ore, 48% Cr.O. crude, c.i.f. Atlantic seaboard 22.50

Coke

Per Net Ton

Furnace, f.o.b. Connellsville, prompt $2.50
Foundry, f.o.b. Connellsville, prompt ..... $3.25 to 4.75
Foundry, by-product, Ch'go ovens 8.00
Foundry, by-product, New England, del'd 11.00
Foundry, by-product, Newark or Jersey City, delivered ..... 9.00 to 9.40
Foundry, by-product, Phila. 9.00
Foundry, Birmingham 5.00
Foundry, by-product, St. Louis, f.o.b. ovens 8.00
Foundry by-prod., del'd St. Louis 9.00

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines ..... $1.35 to $1.50
Mine run coking coal, f.o.b. W. Pa. mines ..... 1.40 to 1.50
Gas coal, 3-in., f.o.b. Pa. mines ..... 1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines ..... 1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines ..... .65 to .75
Gas slack, f.o.b. W. Pa. mines ..... 1.00 to 1.35

Ferromanganese

Per Gross Ton

Domestic, 80%, seaboard ..... $80.00 to $85.00
Foreign, 80%, Atlantic or Gulf ports, duty paid ..... 80.00 to 00.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% ..... $28.00 to $30.00

Electric Ferrosilicon

Per Gross Ton Delivered

90% $83.50
50% 130.00

Per Gross Ton Furnace		*Per Gross Ton Furnace*	
$35.00	12%	$39.00	
37.00	14 to 16%	39.00	

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
$25.00	13%	$29.00	
26.00	14%	31.00	
27.00	15%	33.00	

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
$21.00	11%	$24.00	
21.50	12%	25.00	
22.00	13%	27.00	
22.50	14%	29.00	
23.00	15%	31.00	

Delivered prices at Chicago are about 50c. a ton below this schedule.

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd carloads $1.08
Ferrotungsten, less carloads ..... $1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads ..... 11.00c.
Ferrochromium, 2% carbon ..... 17.00c. to 17.50c.
Ferrochromium, 1% carbon ..... 19.00c. to 20.00c.
Ferrochromium, 0.10% carbon ..... 24.50c. to 26.00c.
Ferrochromium, 0.06% carbon ..... 26.50c. to 28.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace ..... $3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads $160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton $1.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton 122.50
Silico-manganese, gross ton, delivered 135.00

Fluxes and Refractories

Fluorspar

Per Net Ton

Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines $14.00
No. 2 lump, Illinois and Kentucky mines $17.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid $17.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines 32.50

Fire Clay Brick

Per 1000 f.o.b. Works

	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania $45.00
Chicago 52.00
Birmingham 50.00
Silica clay, per ton ..... $8.50 to 10.00

Magnesite Brick

Per Net Ton

Standard sizes, f.o.b. Baltimore and Chester, Pa. $65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa. 40.00
Standard size 45.00

Chrome Brick

Per Net Ton

Standard size $45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

†Machine bolts 73
†Carriage bolts 73
Lag bolts 73
Plow bolts, Nos. 1, 2, 3 and 7 heads 73
Hot-pressed nuts, blank or tapped, square 73
Hot-pressed nuts, blank or tapped, hexagons 73
C.p.c. and t. square or hex. nuts, blank or tapped 73
Washers* ..... 7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

Per Cent Off List

Semi-finished hexagon nuts 73
Semi-finished hexagon castellated nuts, S.A.E. 73
Stove bolts in packages, P'gh. ..... 80, 10, 10 and 5
Stove bolts in packages, Chicago ..... 80, 10, 10 and 5
Stove bolts in packages, Cleveland ..... 80, 10, 10 and 5
Stove bolts in bulk, P'gh. ..... 80, 10, 10, 5 and 2½
Stove bolts in bulk, Chicago ..... 80, 10, 10, 5 and 2½
Stove bolts in bulk, Cleveland ..... 80, 10, 10, 5 and 2½
Tire bolts ..... 60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland $2.75
F.o.b. Chicago 2.85

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh ..... 70, 10 and 5
F.o.b. Cleveland ..... 70, 10 and 5
F.o.b. Chicago ..... 70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screws ..... 80, 10, 10 and 5
Milled standard set screws, case hardened ..... 80 and 5
Milled headless set screws, cut thread ..... 75 and 10
Upset hex. head cap screws, U.S.S.S. thread ..... 85 and 10
Upset hex. cap screws, S.A.E. thread ..... 85 and 10
Upset set screws ..... 80, 10 and 5
Milled studs 70

▲▲▲ Mill Prices of Finished Iron and Steel Products ▲▲▲

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.75c.
Del'd Philadelphia	1.84c.
Del'd New York	1.99c.
F.o.b. Cleveland	1.65c. to 1.70c.
F.o.b. Lackawanna	1.75c.
F.o.b. Birmingham	1.80c.
C.i.f. Pacific ports	2.25c.
F.o.b. San Francisco mills	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.75c.
F.o.b. Birmingham, mill lengths	1.75c. to 1.80c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.50c. to 1.55c.
F.o.b. Chicago Heights mill	1.60c. to 1.65c.
Del'd Philadelphia	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago	1.70c. to 1.75c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c. to 1.75c.
F.o.b. Birmingham	1.80c.
Del'd Cleveland	1.78½c. to 1.83½c.
Del'd Philadelphia	1.95½c.
F.o.b. Coatesville	1.75c.
F.o.b. Sparrows Point	1.75c.
F.o.b. Lackawanna	1.75c.
Del'd New York	1.93c.
C.i.f. Pacific ports	2.35c. to 2.25c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.65c.
F.o.b. Chicago	1.70c. to 1.75c.
F.o.b. Birmingham	1.80c.
F.o.b. Lackawanna	1.75c.
F.o.b. Bethlehem	1.75c.
Del'd Cleveland	1.78½c. to 1.83½c.
Del'd Philadelphia	1.76c.
Del'd New York	1.96½c.
C.i.f. Pacific ports	2.35c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	1.65c.
Wider than 6 in., P'gh	1.55c.
6 in. and narrower, Chicago	1.75c.
Wider than 6 in., Chicago	1.65c.
Cooperage stock, P'gh	1.90c.
Cooperage stock, Chicago	2.00c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.10c.
Bars, Buffalo	2.10c.
Shafting, ground, f.o.b. mill	*2.45c. to 3.40c.
Strips, P'gh	2.25c. to 2.35c.
Strips, Cleveland	2.25c. to 2.35c.
Strips, deliv'd Chicago	2.35c.
Strips, Worcester	2.50c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.10c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Merchant Trade

	Base per Keg
Standard wire nails	$1.90 to $2.00
Cement coated nails	1.90 to 2.00
Galvanized nails	3.95 to 4.05
	Base per Lb.
Polished staples	2.35c. to 2.45c.
Galvanized staples	2.60c. to 2.70c.
Barbed wire, galvanized	2.55c. to 2.65c.
Annealed fence wire	2.35c. to 2.45c.
Galvanized wire, No. 9	2.80c.
Woven wire fence (per net ton to retailers)	$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage	2.20c. to 2.30c.
Spring wire	3.20c. to 3.30c.

(Carload lots, Chicago district mills)

Wire nails	$1.95 to $2.05
Annealed fence wire	2.40c. (lb.)
Bright hard wire to manufacturing trade	2.25c.
Barbed wire, galv.	2.60c. (lb.)

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh	1.90c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.00c.
No. 10, blue annealed, del'd Phila.	2.19c.
No. 10, blue annealed, B'ham	2.05c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.05c.
No. 13, f.o.b. Chicago dist.	2.15c.
No. 13, del'd Philadelphia	2.34c.
No. 13, blue annealed, B'ham	2.20c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.35c.
No. 24, f.o.b. Chicago dist. mill	2.45c.
No. 24, del'd Philadelphia	2.64c.
No. 24, f.o.b. Birmingham	2.50c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh	3.60c.

Galvanized

No. 24, f.o.b. Pittsburgh	2.90c.
No. 24, f.o.b. Chicago dist. mill	3.00c.
No. 24, del'd Cleveland	3.08½c.
No. 24, del'd Philadelphia	3.24c.
No. 24, f.o.b. Birmingham	3.05c. to 3.15c.

Continuous Mill Sheets

No. 10 gage	1.75c.
No. 13 gage	1.80c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c. to 2.85c.
No. 28, f.o.b. Chicago dist. mill	2.75c. to 2.80c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.30c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	3.25c. to 3.35c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh	3.70c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills	$5.00
Standard cokes, f.o.b. Gary	5.10

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.30	25-lb. coating I.C.	$15.20
15-lb. coating I.C.	12.90	30-lb. coating I.C.	16.60
20-lb. coating I.C.	14.00	40-lb. coating I.C.	17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity bar Base, 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential
2000 (1½% Nickel)	$0.25
2100 (1¾% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ⅝c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	34.00
Light (from rail steel), f.o.b. mill	32.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝ in. and larger	$2.80
Spikes, ½ in. and larger	2.80
Spikes, boat and barge	$3.00
Tie plate, steel	1.95
Angle bars	2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	75 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	*Iron* Inches	Black	Galv.
⅛	47	21½	¼ and ⅜	+11	+36
¼ to ⅜	53	27½	½	23	5
½	58	44½	¾	28	11
¾	62	50½	1 and 1¼	31	15
1 to 3	64	52½	1½ and 2	35	18

Lap Weld

2	57	45½	2	24	9
2½ to 6 and 8	61	49½	2½ to 3½	28	13
	58	45½	4 to 8	30	17
9 and 10	56	43½	9 and 10	29	16
11 and 12	55	42½	9 to 12	28	14

Butt Weld, extra strong, plain ends

⅛	42	26½	¼ and ⅜	+13	+16
¼ to ⅜	49	32½	½	23	4
½	55	44½	¾	28	12
¾	60	49¾	1 to 2	34	18
1 to 1½	62	51½			
2 to 3	62	52½			

Lap weld, extra strong, plain ends

2	55	44½	2	29	12
2½ to 4	59	48½	2½ to 4	34	20
4½ to 6	58	47½	4½ to 6	32	19
7 to 8	54	44½	7 and 8	31	17
9 and 10	47	34½	9 to 12	21	8
11 and 12	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discount of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		*Charcoal Iron*	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	56	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	46		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	48

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

Fabricated Structural Steel

New Projects of 43,000 Tons Include New York Post Office—Awards Total Only 14,000 Tons

NEW projects requiring fabricated structural steel total more than 43,000 tons this week, compared with 50,000 tons a week ago. In the first eight issues of this year, THE IRON AGE has reported a total of 356,000 tons in new projects, compared with 215,000 tons in the same period of 1930. Awards in the same period this year total only 189,000 tons, compared with 289,000 tons a year ago.

Included in this week's new projects are about 6000 tons for a building on Thirty-third Street, between Ninth and Tenth Avenues, New York, for the United States Post Office, 21,000 tons for an elevated highway in New Jersey over the Passaic and Hackensack rivers, and 3000 tons for the electrical group building at the Chicago "Century of Progress Fair."

Awards of 14,000 tons this week include 2050 tons in a subway section in Newark, N. J., 1200 tons for a Medical Center Building in Jersey City, N. J., and 900 tons in a plant for the Clark Thread Co., Austell, Ga. Awards follow:

North Atlantic States

NEW YORK, 3000 tons, addition to Paramount Theatre, to Lehigh Steel Co.

NEW YORK, 400 tons, public school 186 in the Bronx, to Eastern Structural Steel Co.

BROOKLYN, 150 tons, Municipal Court building, to Hecklin Iron Works.

BROOKLYN, 300 tons, public school 161, to Hinkle Iron Construction Co.

LONG ISLAND CITY, 150 tons, warehouse and shop for Crane Co., to Post & McCord Co.

JERSEY CITY, N. J., 1200 tons, building for Medical Center, to Lehigh Structural Steel Co.

NEWARK, N. J., 2050 tons, subway section 3, for city railroad, to American Bridge Co.

ROCHESTER, N. Y., 350 tons, Washington High School, to McClintic-Marshall Co.

The South

LOUISVILLE, KY., 350 tons, 33 pontoons for United States Engineer, to Jones & Laughlin Steel Corpn.

PENSACOLA, FLA., 3500 tons, trestle for Louisville & Nashville Railroad, to Chicago Bridge & Iron Co.

AUSTELL, GA., 900 tons, plant for Clark Thread Co., to McClintic-Marshall Co.

Central States

CUSHOCTON, OHIO, 300 tons, plant building for James B. Clow & Sons, to Jones & Laughlin Steel Corpn.

CLEVELAND, 550 tons, South High School, to Kilroy Structural Steel Co.

BLAIRSTOWN, IOWA, 500 tons, highway bridge, to American Bridge Co.

LACROSSE, WIS., 500 tons, bridge, to Milwaukee Bridge Co.

BLOOMINGTON, ILL., 100 tons, hospital, to Midland Structural Steel Co.

INDIANA HARBOR, IND., AND TEXAS, 950 tons, heaters for Sinclair Refining Co., to Lackawanna Steel Construction Co.

CHICAGO, 300 tons, International House for University of Chicago, to Crane Foundry Co., head.

ST. LOUIS, 110 tons, Memorial Presbyterian Church, to Mississippi Valley Structural Steel Co.

Western States

OMAHA, NEB., 250 tons, Central High School, to Paxton & Vierling Iron Works.

TACOMA, WASH., 600 tons, hangar building, to Wallace Bridge & Structural Steel Co.

DOUGLAS, ORE., 150 tons, reconstruction of Hawthorne bridge, to Poole & McDonald.

PORTLAND, 300 tons, shearer for L. B. Hoskins Transportation Co., to Bethlehem Steel Co.

Canada

VANCOUVER, B. C., 2500 tons, plates, 20 to 36-in. welded steel pipe, to Vancouver Engineering Works.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

NEW YORK, 200 tons, apartment building at 31 East Thirty-seventh Street.

NEW YORK, 200 tons, building for General Theological Seminary at Ninth Avenue and West Twentieth Street.

NEW YORK, 6000 tons, building for Parcel Post division, United States Post Office, West Thirty-third Street, between Ninth and Tenth Avenues.

NEW YORK, 400 tons, public school No. 129, in Queens.

WHITE PLAINS, N. Y., 350 tons, building for Battle Hill School.

FRENCHTOWN, N. J., 900 tons, bridge to Uhlerstown, Pa.; F. H. Clement & Co., Bethlehem, Pa., low bidder on general contract.

STATE OF NEW JERSEY, 1000 tons, highway bridges.

STATE OF NEW JERSEY, 21,000 tons, first section of elevated highway over Hackensack and Passaic rivers.

PHILADELPHIA, 400 tons, alterations to Pier 11 on Delaware River.

PITTSBURGH, 750 tons, shapes and steel piling for substructure of Pittsburgh Post Office.

The South

LITTLE ROCK, ARK., 200 tons, bridge for Arkansas Highway Commission.

HOUSTON, TEX., 150 tons, false work for concrete for McKee Street bridge.

PANAMA CANAL ZONE, 500 tons, transmission towers.

Central States

DETROIT, 2000 tons, Harbiak Avenue bridge; American Bridge Co., low bidder.

DOWNEYVILLE, MO., 1000 tons, bridge for Missouri-Kansas-Texas Lines.

CHICAGO, 3000 tons, electrical group building for World's Fair.

CHICAGO, 1300 tons, Marion Avenue bridge.

Western States

FARMINGTON, N. M., 400 tons, bridges for New Mexico Highway Commission.

PORTLAND, ORE., 700 tons, Federal building, Madison Street; bids being taken.

PORTLAND, 2000 tons, Lloyd Hotel; bids to be called soon.

PORTLAND, 3100 tons, Commonwealth Building; bids to be called soon.

Canada

STE. THOMAS, ONT., 1000 tons, bridge over Kettle Creek for Pere Marquette Railroad.

LOUP ROUGE, QUE., 100 tons, bridge over Jacques Cartier River, for Town Council.

Armco Organizes New Manufacturing Unit

The American Rolling Mill Co., Middletown, Ohio, has organized a pipe manufacturing department to make spiral welded pipe, with C. C. Clarke in charge as superintendent. This department will also make other sheet products. A new sales division has been organized also to handle distribution of spiral welded pipe. R. C. Beam is manager of this department, with H. M. Ives as assistant.

Scrap Prices Lower at Detroit

DETROIT, Feb. 17.—Scrap prices are easier. Heavy melting steel is down 25c. a ton and compressed sheets and stove plate are off 50c. Prices have been higher here than in other markets on account of the local demand for scrap, but this situation is changing, with the result that further weakness would not be unexpected.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$9.75 to	$10.25
Borings and short turnings	5.25 to	5.75
Long turnings	4.50 to	5.00
No. 1 machinery cast	10.00 to	10.50
Automotive cast	11.50 to	12.00
Hydraul. comp. sheets	9.50 to	10.00
Stove plate	6.75 to	7.25
New No. 1 busheling	8.00 to	8.50
Old No. 2 busheling	3.50 to	4.00
Sheet clippings	6.25 to	6.75
Flashings	7.75 to	8.25

Morse Chain Co., Ithaca, N. Y., manufacturer of chain drives, flexible couplings and chain speed reducers, has held its annual sales convention. Salesmen from the entire country spent three days at the main plant at Ithaca, leaving there by special car for a one-day session at Detroit.

The annual convention and Informashow of the National Association of Purchasing Agents will take place in Royal York Hotel, Toronto, Ont., June 8 to 11, inclusive. G. A. Renard, 11 Park Place, New York, is secretary-treasurer.

Sales of aircraft and parts by 130 manufacturers in 1929 totaled $60,752,000, according to the Bureau of the Census.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Higher—Tin More Active—Lead Firm—Zinc Lower

NEW YORK, Feb. 17.

Copper

Three developments have been decidedly constructive in the past week. These have been the establishing of a 10c. price, appearance of a larger domestic demand and the re-entrance of primary producers as sellers. A week ago the advance to 10c., delivered in the Connecticut Valley, for electrolytic copper was forecast, and this price seems firmly established by quite large sales to domestic consumers as far ahead as April. These buyers have been almost entirely out of the market until now. It is estimated that close to 25,000 gross tons has been sold to such melters in the last 10 days. Foreign consumers continue to buy quite liberally, with total sales for foreign shipment about 26,000 tons thus far this month. Primary producers, who have been out of the market for some weeks, leaving current business to custom smelters, have again become active and have done a good business at the 10c. level. Their specifications on contract have also been very satisfactory. Copper Exporters, Inc., has also advanced the quotation to 10.30c., c.i.f. usual European ports. Lake copper is a little more active at 10c. to 10.12½c., delivered. January statistics were considered favorable in that they showed a reduction of about 3300 tons in refined stocks, 8100 tons in blister stocks and nearly 4000 tons in production.

Tin

The Lincoln holiday interfered somewhat in this market, but on Feb. 13 consumers did considerable buying, most of it for nearby positions with the rest for forward delivery as far ahead as the third and fourth quarters. Prices during the week have changed little, those in London today being £118 2s. 6d. for spot standard, £119 15s. for future standard and £121 12s. 6d. for spot Straits. Because of the Chinese new year holiday, there is no quotation from the Far East today. The quotation here today for spot Straits was 26.50c., New York. Shipments from the Straits for the first half of February were very high at 5229 tons. Stocks in British warehouses on Feb. 14 were 24,116 tons, an increase of only 10 tons for the week, the small increase being due largely to a shipment of 316 tons to the United States.

THE WEEK'S PRICES, CENTS PER POUND FOR EARLY DELIVERY

	Feb. 17	Feb. 16	Feb. 14	Feb. 13	Feb. 11
Lake copper, New York	10.12½	10.12½	10.12½	10.12½	10.12½
Electrolytic copper, N. Y.*	9.75	9.75	9.75	9.75	9.75
Straits tin, spot, N. Y.	26.60	25.75	.....	25.75	26.12½
Zinc, East St. Louis	4.00	4.00	4.00	4.00	4.00
Zinc, New York	4.35	4.35	4.35	4.35	4.35
Lead, St. Louis	4.30	4.30	4.30	4.30	4.30
Lead, New York	4.50	4.50	4.50	4.50	4.50

*Refinery quotation, price 1½c. higher delivered in the Connecticut Valley.

Lead

Heavy buying by practically all users of lead has been a feature of the week. There has been a pronounced desire to purchase for April, but sellers have been willing to part only with February and March metal. Prices are very firm at 4.30c., St. Louis, with the quotation of the leading interest at 4.50c., New York.

Zinc

Prime Western zinc has again fallen to 4c., and buying has been fairly heavy. As a result, quotations are firm at 4c., East St. Louis, and 4.35c., New York, with the belief expressed that the trend from now on will be upward and that it will be some time before this low level is again reached. The ore market is slightly easier at $25 and $26, Joplin, with the sales last week at 5920 tons. Shipments were 5773 tons, with the output for the week at 7200 tons, leaving the estimated surplus at 54,500 tons.

Antimony

In a quiet market, Chinese metal is quoted at 7.10c. for spot and 6.87½c. to 7c. for futures, New York, duty paid.

Nickel

The long-established prices still prevail, and wholesale lots of ingot nickel are quoted at 35c. a lb., with

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	17.12½c.
*Copper, hot rolled, base sizes	19.75c.
Seamless Tubes—	
Brass	22.00c.
Copper	22.12½c.
Brass Rods	15.37½c.
Brazed Brass Tubes	25.00c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks	9.75c. to 10.25c.
Zinc sheets, open	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	29.00c. to 30.00c.
Tin, bar	30.00c. to 31.00c.
Copper, Lake	11.50c. to 12.00c.
Copper, electrolytic	11.25c. to 11.75c.
Copper, casting	11.00c. to 11.50c.
Zinc, slab	5.50c. to 6.50c.
Lead, American pig	5.50c. to 6.50c.
Lead, bar	7.50c. to 8.50c.
Antimony, Asiatic	10.00c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	24.00c. to 25.00c.
Alum. ingots, No. 12 alloy	23.00c. to 24.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½	19.75c. to 20.75c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig	29.75c.
Tin, bar	31.75c.
Copper, Lake	11.13c.
Copper, electrolytic	11.13c.
Copper, casting	10.75c.
Zinc, slab	5.50c.
Lead, American pig	5.25c. to 5.50c.
Lead, bar	8.00c.
Antimony, Asiatic	11.00c.
Babbitt metal, medium grade	15.25c.
Babbitt metal, high grade	33.75c.
Solder, ½ and ½	19.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.00c.	9.00c.
Copper, hvy. and wire	7.75c.	8.75c.
Copper, light and bottoms	7.00c.	8.00c.
Brass, heavy	4.50c.	5.50c.
Brass, light	4.00c.	4.75c.
Hvy. machine composition	7.00c.	8.00c.
No. 1 yel. brass turnings	5.00c.	5.50c.
No. 1 red brass or comples. turnings	6.50c.	7.50c.
Lead, heavy	3.25c.	3.75c.
Lead, tea	2.00c.	2.50c.
Zinc	2.00c.	2.50c.
Sheet aluminum	7.50c.	9.50c.
Cast aluminum	5.00c.	7.50c.

shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum

Virgin metal, 98 to 99 per cent pure, is obtainable at the published quotation of 22.90c. a lb. delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Feb. 17.—There is little of interest in this market except the fact that copper prices have strengthened. Quotations on tin and zinc are lower. The old metal market is dull.

Prices per lb. in carload lots: Lake copper, 10.12½c.; tin, 26.40c.; lead, 4.30c.; zinc, 4.10c.; in less-than-carload lots, antimony, 8.25c. On old metals we quote copper wire, crucible shapes and copper clips, 7.50c.; copper bottoms, 6.50c. to 7c.; red brass, 6.50c. to 7c.; yellow brass, 4.50c. to 5c.; lead pipe, 3.50c. to 3.75c.; zinc, 1c. to 1.25c.; pewter, No. 1, 14.50c.; tin-foil, 0.50c.; block tin, 21.50c.; aluminum, 6c. to 6.50c.; all being dealers' prices for less-than-carload lots.

Railroad Equipment

Western Pacific is inquiring for 10 Mallet locomotives.

Pittsburgh Gas Works Co. has ordered seven 3-ton cars from the American Pipe Car Corp.

Hocking Gas Transmission Co. inquiries for 1 tank car.

Railway Refrigerator Car Co. is asking for prices on ten refrigerator cars.

Board of Transportation, New York, will take bids Feb. 26 on 16 service cars.

Wheeling Steel Corpn. has contracted for the repair of 15 hopper cars with Pressed Steel Car Co.

Government of Ecuador has ordered for the P. S. F. Quito Ecuadorian line 2-8-0 type locomotive from Baldwin Locomotive Works.

Missouri Pacific has ordered 200 box cars, 100 tank cars from Pressed Steel Car Co., 100 box cars from Mount Vernon Car Co. and 400 box cars from American Car & Foundry Co.

Steel Plants Had 37 Days' Coal Supply on Jan. 1

WASHINGTON, Feb. 17.—Steel plants had 37 days' supply of coal in stock on Jan. 1, against 35 days' supply on Nov. 1, 1930, according to the Bureau of Mines. Stocks at by-product coke plants on Jan. 1 represented 38 days' supply, unchanged from Nov. 1. The supply at steel plants on Jan. 1 of gas coal was sufficient for 55 days, against 53 on Nov. 1, while steam coal supplies represented 30 and 27 days respectively. By-product coke plant supplies of low volatile coal on Jan. 1 were adequate for 49 days, compared with 51 days on Nov. 1. Supplies of high volatile coal were enough for 35 and 34 days, respectively.

Reinforcing Steel

Awards and Inquiries in Lighter Volume

THE volume of reinforcing steel lettings the past week, at 5700 tons, fell below those of the last four weeks. The largest awards were 1800 tons for Ogden Avenue improvements in Chicago and 1000 tons for State road work in Illinois. Pending projects also were lighter, totaling 4000 tons, compared with 6500 tons a week ago and 7800 tons two weeks ago. Awards follow:

WORCESTER, MASS., 750 tons, New England Telephone & Telegraph Co., not to Concrete Steel Co.

CAMDEN, N. J., 580 tons, section 2 of Newton Creek Railroad subway, to Joseph T. Ryerson & Son, Inc.

BROOKLYN, 125 tons, Navy Yard building, to Joseph T. Ryerson & Son, Inc.

PORT CHESTER, N. Y., 175 tons, barracks, to Concrete Steel Co.

DETROIT, 500 tons, New Olympia Building, to Palmer-Bee Co.

STATE OF IDAHO, 1000 tons, road work, to various bidders.

CHICAGO, 1800 tons, Ogden Avenue improvement, to several unnamed bidders.

CHICAGO, 250 tons, Wendell Phillips school, to Inland Steel Co., previously reported to an unnamed bidder.

MILWAUKEE, 200 tons, grade separation for Milwaukee Road, to Truscon Steel Co.

BLOOMINGTON, IND., 125 tons, building for University of Indiana, to Hugh Baker & Co.

HAWTHORNE, NEV., tonnage unstated, arsenal for Government, to an unnamed bidder.

LOS ANGELES, 200 tons, Alexander Hamilton School, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

STATE OF NEW YORK, 200 tons, three bridges at Jones Beach; Smith Brothers, White Plains, N. Y., low bidder on general contract.

STATE OF NEW JERSEY, 125 tons, two bridges at Hackensack; Booth Brothers, Paterson, N. J., low bidder on general contract.

STATE OF NEW JERSEY, 500 tons, routes 1 and 4, sections 2, 4 and 6 of elevated highway over Hackensack and Passaic Rivers; bids open March 2.

STATE OF NEW JERSEY, tonnage not yet available, highways and bridges in Bergen, Morris and Essex counties; bids open March 2.

WHITE PLAINS, N. Y., 100 tons, foundations and first story of Battle Hill School.

NEW YORK, 250 tons, building on West Thirty-third Street, between Ninth and Tenth Avenues, for Parcel Post division, United States Post Office.

NORRISTOWN, PA., 215 tons, sewer; Seeds & Dorham, Philadelphia, low bidder on general contract.

ARDMORE, PA., 140 tons, building for Ardmore *Times;* S. L. Fretz, Philadelphia, general contractor.

WASHINGTON, 275 tons, building for Standard Oil Co. of New Jersey.

DETROIT, 520 tons for Detroit Edison Co.

DETROIT, 250 tons, Detroit Water Board.

REDFORD, MICH., 250 tons, high school.

FORT WAYNE, IND., 500 tons, municipal reservoir.

CHICAGO, 450 tons, warehouse for R. C. Ralston Co.

CHICAGO, 125 tons, bridge on Manistee Road; Arcole Construction Co., general contractor.

CHICAGO, tonnage being estimated, superstructure for the Illinois Central's portion of the Randolph Street viaduct.

DAVENPORT, IOWA, 200 tons, Mercy Hospital.

Industrial Finances

Blaw-Knox Co., Pittsburgh, had net earnings in the year ended Dec. 31 of $2,689,208, equivalent to $2.03 a share earned on the 1,322,395 shares outstanding. This compares with $2,838,735, or $2.16 a share, on the average shares outstanding during 1929. Net sales during 1930 totaled $16,646,612, as compared with $17,493,414 in the preceding year.

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Harbison-Walker Refractories Co., Pittsburgh, during 1930 earned $3,811,558, equivalent to $2.52 a share on common stock. During 1929, $3.53 was earned on the same stock.

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Mesta Machine Co., Pittsburgh, had net profits during 1930 of approximately $2,500,000, according to preliminary reports. This compares with $1,797,242 in 1929.

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United Engineering & Foundry Co., Pittsburgh, in the year ended Dec. 31, 1930, had net earnings after depreciation and Federal taxes of $2,114,359, equivalent after payment of preferred dividends to $4.86 a share earned on the 146,118 shares of no par value common stock outstanding. This compares with $1,671,887 earned in the preceding year, which was equivalent to $3.75 a share on the common stock.

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Arthur G. McKee & Co., Cleveland, report net earnings for 1930 of $547,747, equivalent to $6.49 a share on the 84,410 shares of class B stock, compared with $5.29 a share in 1929.

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M. A. Hanna Co., Cleveland, reports that its net profits for 1930 were $2,266,814 after all charges, including deduction of $394,636 for depreciation and depletion. Net earnings were $2,425,430 in 1928 and $3,646,322 in 1929. The company's investment account, given at $41,867,260, includes substantial holdings in the National Steel Corpn.

Structural Steel Salesmen's Association will hold its fourth annual convention Feb. 26 and 27 at the Hotel Fontenelle, Omaha, Neb.

Automobile Companies Buy More Freely; Great Lakes Plant at 100 Per Cent

DETROIT, Feb. 16.

THERE has been a spurt in steel buying in the automobile industry during the past week. It has extended into almost all classes of products commonly used in the manufacture of motor vehicles, particularly benefiting bar, sheet and strip mills. One result of the flurry is that Great Lakes Steel Corpn. today began operating all six of its 150-ton open-hearth furnaces at its Ecorse, Mich., plant for the first time since production got under way last August. It has scarcely any backlog of ingots and sheet bars; therefore its schedule of 100 per cent of ingot capacity is justified by the current needs of its hot strip mill and the demand for sheet bars from the neighboring sheet mills of Michigan Steel Corpn.

Some say that Great Lakes is getting its business at the expense of mills in the Youngstown district, others that it consists of tonnage formerly furnished by Chicago interests. It is safe to say, however, that it is drawing orders from customers who secured their steel from numerous sources and that Detroit is convinced that it will continue to get its share of the total bookings. The fact that it is financed to a considerable extent by local capital, that it is a local enterprise employing local workers, is assurance that it will obtain a generous measure of support from Detroit's steel users.

Operation of Great Lakes' entire battery of open-hearths means that the Hanna Furnace Corpn., now supplying hot metal from the larger of its two blast furnaces at Zug Island, will soon blow in the smaller furnace. Great Lakes has some cold pig on hand to tide it over a temporary period, but if the open-hearths should continue at the present rate very long, the extra tonnage from the second blast furnace will be required.

Stocks of Steel and Car Parts Low

ON many occasions men both inside and outside of the steel industry have commented on the depleted state of users' stocks and on the fact that, if a sudden demand for motor cars were created, manufacturers would find difficulty in getting materials and parts quickly. This situation has recently arisen as a warning of what might be expected in case a buying movement suddenly developed. Because it was unable to deliver a certain size of a certain grade of steel speedily enough from its own mill to keep automobile assembly lines moving, a steel maker the past two weeks has been purchasing the tonnage in the open market in order to retain its customer's business.

A spurt of steel buying by the automobile industry has benefited bar, sheet and strip mills.

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Great Lakes Steel Corpn. is operating at 100 per cent of ingot capacity, using all six of its open-hearth furnaces.

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Automobile makers are purchasing parts at lower prices by narrowing their sources of supply and enabling the parts companies to get cheaper costs on account of a larger volume of business.

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Synchro-mesh transmissions are being trucked from Muncie, Ind., to Pontiac, Flint and Lansing in order to keep car assembly lines moving on higher production schedules than originally anticipated.

There is an excellent example in the automobile industry itself of what happens as a result of the current policy of maintaining stocks of parts practically at the vanishing point. Oldsmobile, Oakland, Pontiac and all models in the Buick line went over to synchro-mesh transmissions the first of the year. The transmissions are made at Muncie, Ind., and a conservative program of deliveries had been figured out to take care of the needs of these companies. The 1931 Oakland and Pontiac cars got a better reception than either factory or dealers had counted on, necessitating a hurried upward revision of production; the Oldsmobile likewise scored a success. Buick, of course, has been maintaining a fairly steady operating pace. Consequently orders for transmissions increased overnight and the ability of the factories to turn out cars soon was measured by the number of transmissions they could get. In order to prevent a hold up of assembly lines, transmissions have been trucked in the emergency from Muncie to Pontiac, Flint and Lansing.

Ford Planning to Step Up Production

THERE is little new to be said about the two leading automobile companies. Ford is planning to step up production at the Rouge plant. Detroit still is alive with stories of a Ford eight, but for every story that may have some basis in fact, nine cannot be substantiated. Chevrolet is satisfied to maintain its schedule of about 67,000 cars for February, with a gain anticipated in March. One of the bright spots at the moment is Chrysler, which is doing the best since early last year. Oakland-Pontiac is not veering from its goal of 10,000 cars this month, and further improvement is looked for next month. A large percentage of the company's output is Pontiacs, although the Oakland also has been favorably received. Oldsmobile has increased production several times. Incidentally, there has been some speculation as to whether Oldsmobile might bring out an eight, now that the Viking has been abandoned. It is reported by observers that the company will stand by the six during 1931, but will get into the eight-cylinder field a year hence.

Auburn still is the talk of the town as well as of the stock market. Sales of its new line apparently show no signs of subsiding, and its various subsidiary companies are being taxed to capacity to furnish enough parts to meet current assembly programs. The body plant at Connersville is running virtually at capacity and the Cord-owned limousine body factory at Kalamazoo is furnishing bodies for the Auburn plant. Buick is going along rather quietly, making 500 to 600 cars four days a week, or close to 8000 for the month. Studebaker is recovering somewhat and in February will manufacture over 5000 cars. Cadillac is said to be doing fairly well, also Packard. Willys-Overland at Toledo has disappointed. Instead of producing 8000 cars in January, as contemplated, it turned out little more than 4000, and its February program is not encouraging. Reo is assembling perhaps 50 cars a day. Hupp's activities

seem to be rather irregular. It is understood that the new DeVaux car will get into production at the Hayes body plant at Grand Rapids about March 1. Hudson-Essex has not shown improvement, going along at about 2000 cars a week.

Automobile executives are hammering constantly on the necessity of lower production costs. The latest illustration is the action of a prominent company in placing parts contracts with fewer sources of supply. That is, it has been buying certain parts from about 10 companies, but has decided to choose perhaps three of them to make all of the material formerly allocated among the entire 10. By giving a larger volume of business to a few plants, the automobile manufacturer figures that they will be able to make the parts at a lower cost and pass on the savings in the form of a lower price per part. It is reported that a large automobile body company has adopted the same policy in ordering body die castings.

Automobile Companies Proceed Along Conservative Lines

THERE is abundant evidence that automobile companies are satisfied to be conservative, at least until the business situation gives promise of sustained betterment. Take the example of a company in the higher bracket of the medium-priced class which lost considerable money last year. Its 1930 models did not interest the public. If it would regain favor, it must offer something new. One of the body makers suggested a somewhat radical change in body design, a change which in normal circumstances probably would appeal to the daring spirit which has so often been demonstrated in the automobile industry. In reality, the company was asked to gamble half a million dollars to try to stage a sensational comeback. But it declined, retaining almost the same body design as last year, using free wheeling as a bait for customers. It is estimated that the installation of this feature costs only about $25 more per car than the conventional type of transmission. Thus far the result of this decision has not been promising, for the company's sales have remained at a low point.

Foundry Operations Improve

THERE are bright spots in the foundry trade. Notwithstanding reports of a much higher production rate, the Chevrolet foundry at Saginaw has been pouring slightly over 1100 tons of iron daily. The malleable foundry of General Motors at Saginaw also is very busy. The Buick foundry has a fairly good schedule, while the Oakland foundry is said to be running at a higher rate. Cadillac and Packard units are moderately engaged. Several small foundries serving the automobile trade and located in small Michigan cities are operating at capacity. The jobbing foundries, in general, are getting little business.

Only 16 Locomotives Shipped in January

WASHINGTON, Feb. 17.—Shipments of railroad locomotives in January, 1931, totaled 16 units, compared with 49 last December. All of the January shipments were for domestic use, and consisted of 10 steam and six electric locomotives. Unfilled orders at the end of January were 91 locomotives, made up of 78 steam and 12 electric units for domestic use and one steam locomotive for foreign shipment.

Organize Welding Society in St. Louis

With 65 charter members representing 26 companies in St. Louis, East St. Louis, and Madison, Ill., the St. Louis Welding Society was formed at a meeting held recently at the Forest Park Hotel, St. Louis. This new organization is an outgrowth of monthly welding meetings conducted by the Hill Equipment Engineering Co. Temporary headquarters are at 4620 Delmar Boulevard, which is also the headquarters of the Hill Company.

Officers of the new society are: President, E. P. Barnes of Moloney Electric Co.; vice-president, W. D. Patterson, American School of Welding; and secretary and treasurer, Basil N. Osmin, Hill Equipment Engineering Co. Directors include F. J. Feldhaus, Heine Boiler Co.; George Frankey, Alpha Tank & Sheet Metal Works; A. V. Fausek, Modern Engineering Co.; Lyman Goodin, Midwest Piping & Supply Co.; F. Tidwell, John Nooter Boiler Works; and A. E. Eidson, St. Louis Structural Steel Co.

Educational tours through local plants that utilize welding processes, and lectures by men prominent in the welding industry are activities planned.

The Hill Equipment Engineering Co., from whose meetings the society is an outgrowth, is the exclusive eastern Missouri and southern Illinois dealer for equipment made by the Lincoln Electric Co., Cleveland. It is headed by Lockwood Hill, a pioneer in the arc welding field.

Samuel G. Keywell, of the Samuel G. Keywell Co., Detroit, was elected president of the Cleveland-Detroit chapter of the Institute of Scrap Iron and Steel at the annual meeting Feb. 10 at Detroit.

AT LAST, THE SAFE AIRPLANE!

AN airplane that is said to be almost the last word in safety was demonstrated recently at the North Beach Airport on Long Island. Experts said that it could not dive, stall or spin. With engine power shut off while it was in the air, it came down softly and slowly, the pilot waving both hands to prove that he was not working the controls. The inventor of the plane is Albert Adams Marrill.

▲▲▲ PERSONALS ▲▲▲

GEORGE H. BLAKELEY, new president of the McClintic-Marshall Corpn. now a subsidiary of the Bethlehem Steel Corpn., has announced the appointment of ELBERT A. GIBBS as vice-president in charge of operations; C. M. DENISE as vice-president in charge of sales, and E. J. PATTERSON as vice-president and treasurer. Mr. Gibbs is a graduate of the University of Minnesota. After two years of railroad work, he entered the University of California and received his civil engineering degree in 1905. He was an instructor in civil engineering at Cornell University from 1905 to 1907, after which he became connected with the estimating and designing department of McClintic-Marshall, and in 1908 was placed in charge of that department. In 1910 he was appointed manager of erection west of Harrisburg, Pa. His service with McClintic-Marshall was interrupted by the World War, in which he served with distinction and emerged with the rank of colonel and was breveted with the Secret Service medal and the Legion of Honor. Upon resuming his position with McClintic-Marshall, he was promoted to general manager in 1919 and became vice-president and general manager in 1929. Mr. Denise is a graduate of Rutgers College and took post graduate work at Lehigh University, where he received a degree in civil engineering in 1898. From 1899 to 1903 he was with the Schiffler Bridge Co., Pittsburgh, then joining the McClintic-Marshall Co. From 1904 to 1919 he was in charge of sales for that company in Chicago, and in 1919 was placed in general charge of sales in the Pittsburgh office. Mr. Patterson joined the McClintic-Marshall Co. in 1902 as auditor, and in 1929 was made vice-president and treasurer. The appointees will have their headquarters at Bethlehem, Pa.

WILLIS L. KING, vice-president of the Jones & Laughlin Steel Corpn., Pittsburgh, celebrated his eightieth birthday on Feb. 14.

GEORGE R. SULLIVAN, vice-president, Rogers Brown & Crocker Brothers, associated for many years with Rogers, Brown & Co. and later with the new company in the Philadelphia district, has resigned and plans to spend the next two months in Florida before making a new connection.

PHILIP P. BROWN, formerly vice-president and general manager of the steel and warehouse department of the Wilkoff Co., has become associated with Friedman Brothers & Co., Inc., Cleveland.

WADE M. BRISON, recently superintendent of the roll shop of the International Nickel Co., Huntington, W. Va., and previously with the United Engineering & Foundry Co., Pittsburgh, has rejoined the latter company as a member of the roll and steel castings sales department. Mr. Brison for 13 years was at the Lincoln works of the United company, where he served successively as draftsman, assistant designer and assistant superintendent of the roll shop.

JOHN C. GRIFFIN has joined the United Engineering & Foundry Co., Pittsburgh, as its Eastern sales representative. Prior to engaging in the sale of rolling mill equipment with the Hubbard Steel Foundry Co., two years ago, Mr. Griffin was manager of the sheet and tin mills of the Bethlehem Steel Co., Sparrows Point, Md., and also had served as manager of LaBelle and the Laughlin works, American Sheet & Tin Plate Co., and as manager of the tin mills of the Weirton Steel Co.

WILLIAM MACFADDEN, formerly vice-president of the Chicago-Naugatuck Crucible Co., has joined the Bartley Crucible & Refractories Co., Trenton, N. J. He will serve in a general executive capacity and have his headquarters at the company's general offices in Trenton.

R. M. CHESTER has been appointed general sales manager of Neely Nut & Bolt Co., Pittsburgh. He will make his headquarters in the general offices of the company in Pittsburgh.

GERARD SWOPE, president, General Electric Co., New York, will be the principal speaker at the fifty-first annual banquet of the Engineers' Society of Western Pennsylvania, to be held at the William Penn Hotel, Pittsburgh, on Feb. 26. GEORGE GORDON CRAWFORD, president, Jones & Laughlin Steel Corpn., Pittsburgh, is to be toastmaster.

MILLARD ROMAINE, manager, engineering service department, Cincinnati Milling Machine Co., Cincinnati, delivered an address on "Recent Milling Machine Applications" at a meeting of the Machine Shop Division of the American Society of Mechanical Engineers in Detroit, Feb. 16. Following this, HANS ERNST, research engineer of the same company, delivered a talk on "Hydraulic Applications in Machine Tools."

AUGUSTUS WOOD, from 1915 to 1920 chief engineer and works manager of the Niles Tool Works, Hamilton, Ohio, has returned to that company in the capacity of consulting engineer. During his absence he has held the positions of works manager at the Putnam Machine Co., Fitchburg, Mass., and consulting engineer for Manning, Maxwell & Moore, Inc. More recently he has been consulting engineer for the Consolidated Machine Tool Corpn., Rochester, N. Y.

JAMES S. BURCH, who has been identified with the technical staff of the American Road Builders' Asso-

J. B. JOHNSON, chief, materiel branch, War Department, Wright Field, Dayton, Ohio, receiving the Morehead Medal of the International Acetylene Association at the recent annual meeting. (Left to right)—C. A. McCune, Welding Engineering & Research Corpn., New York, retiring president of the association; J. B. Johnson; A. C. Morrison, Union Carbide Co., New York, secretary and treasurer; W. A. Slack, Torchweld Equipment Co., Chicago, past-president; W. D. Flannery, K-G Welding Co., New York, president-elect of the association.

riation, has been appointed research engineer of the Wire Reinforcement Institute, Washington.

OSCAR E. ZENKER, formerly vice-president and production manager, Reliance Bronze & Steel Corpn., Brooklyn, has been placed in charge of the New York office at 101 Park Avenue, of the Metal Forming Corpn., Elkhart, Ind.

C. S. BRAVIN has been made sales manager for Canada of the Electro Metallurgical Co. of Canada, Ltd., Welland, Ont. He has been identified with the Welland organization for the past 20 years, during the last six years supervising the head sales and purchasing department.

RALPH B. KENNARD, formerly head of the physics department of Roberts College, Istanbul, Turkey, has been appointed a research associate of the Bureau of Standards, Washington, to conduct research work in heat transfer problems in accordance with the provisions of the Luther B. McMillan Fellowship. The fellowship was established by the Johns-Manville Corpn. as a memorial to the late Luther B. McMillan, consulting engineer and a pioneer in research in heat transfer problems.

D. S. OAKLEY, for the past 12 years New York district sales manager for Yates-American Machine Co., has been appointed Detroit district sales engineer for the J. A. Fay & Egan Co., Cincinnati.

THOMAS CROKER, who has been made manager of the Buffalo office of the Chain Belt Co., Milwaukee, has been succeeded as manager of the Cleveland office by Mr. SMALLSHAW. FRANK GARY has been transferred from the Buffalo office to St. Louis to take the place of Mr. Smallshaw. HY BERGIS has been transferred from the Seattle office to the Portland office and GERALD NICHOLS has gone to take charge at Seattle. W. F. NICHOLS continues as Northwest manager.

C. H. MURRAY, director of personnel service, American Rolling Mill Co., has been appointed a member of the National Industrial Conference Board Advisory Committee on Industrial Relations. Mr. Murray succeeds CHARLES R. HOOK, Armco's president, in this position.

O. A. ROUSSEAU, assistant manager of the sales engineer department, Norton Co., Worcester, Mass., spoke on recent developments of the grinding wheel industry before the Hartford, Conn., chapter of the American Society for Steel Treating on Feb. 10.

H. M. LANE, industrial engineer, Detroit, was the guest of the New England Foundrymen's Association in Boston on Feb. 11. He discussed various types of melting, and modern foundry arrangements and installations in various part of the country.

A. J. VIERLING, formerly president, has been elected chairman of the board of Paxton & Vierling Iron Works, Omaha, Neb. Other officers are D. T. MOLTHOP, president; F. E. OWEN, vice-president and manager, and HUGO STRYKER, secretary and vice-president.

F. H. BROWNELL, of New York, has been elected chairman of the finance committee by directors of Revere Copper & Brass, Inc. C. D. DALLAS, of Chicago, has been elected president, succeeding GEORGE ALLEN, who has become chairman of the executive committee. H. S. ULLMANN has succeeded Mr. Dallas as vice-president in charge of the Dallas division in Chicago.

RALPH MODJESKI, consulting engineer, will be given the Washington Award for 1931, on Feb. 25 at a reception to be held in the Red Lacquer Room, Palmer House, Chicago. The award will be made by the Washington Award Commission representing the American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers, American Institute of Electrical Engineers, and the Western Society of Engineers. Mr. Modjeski has already been recognized by such honors as the John Fritz Medal, the Franklin Medal, the French Legion of Honor and two honorary degrees of Doctor of Engineering.

HERBERT ZENATY, manager of trade publicity for the Prague Iron Co., the Vitkovice Iron & Steel Mills and the Banska Hutni Co., Prague, Czechoslovakia, is now in this country to investigate American methods of stimulating consumption of iron and steel. The three companies he represents recently created a joint trade stimulation bureau for the purpose of increasing the use of iron and steel in Czechoslovakia.

OSBEN R. ADAMS, machinery dealer of Rochester, N. Y., is moving his office on March 1 to 316 Broad Street, where he will have facilities for the storage and display of machinery.

BURNHAM FINNEY, resident editor of THE IRON AGE in Detroit, addressed the monthly meeting of the Dayton, Ohio, chapter of the American Society for Steel Treating, Feb. 16, on the future of the small industrial plant. DR. JOHN GANN, chief metallurgist, Dow Chemical Co., Midland, Mich., also was a speaker.

ANTHONY SAVARESE, 1 East Forty-third Street, New York, has been appointed receiver for the Greenwood Brass & Iron Foundry, 190 Twenty-fifth Street, Brooklyn.

Fabricated Plate Orders Off 26 Per Cent in 1930

WASHINGTON, Feb. 17.—Orders for fabricated steel plate in 1930 totaled 469,435 tons, compared with 638,67[illegible] tons in 1929, a decline of about 2[illegible] per cent, according to reports received by the Bureau of the Census from 5[illegible] manufacturers. The 1930 orders follow: Oil storage tanks, 115,454; refinery materials and equipment, 50,[illegible]943; tank cars, 32,372; gas holders, 45,804; blast furnaces, 10,357; miscellaneous, 214,505 tons.

Orders last December amounted to 26,787 tons, against 33,151 tons in November. The December orders were: Oil storage tanks, 5118; refinery materials and equipment, 4927; tank cars, 33; gas holders, 3347; blast furnaces, 135; miscellaneous, 13,227 tons.

Association Formed for Electrical Exports

WASHINGTON, Feb. 17.—The Westinghouse Electric International Co. and the International General Electric Co., Inc., New York, have organized the Electrical Apparatus Association and filed papers under the Webb-Pomerene export act with the Federal Trade Commission for exporting electrical and other apparatus, materials and goods. The association will maintain offices at 120 Broadway, New York. Officers of the association are George H. Bucher and George H. Magner, managers, and H. F. A. Schoenfeld, manager and supervisor.

National Radiator Corpn. to Be Reorganized

The National Radiator Corpn., Johnstown, Pa., with plants in several cities, which was formed in 1927 as a merger of a number of heater companies, will undergo a reorganization. A reorganization committee has recommended the omission of payment of February interest on outstanding debentures and the drastic reduction of fixed charges to preserve cash resources and to permit the employment of liquid assets in the current conduct of its business. The Bankers Trust Co., New York, has been named depositary so that those agreeing to the reorganization plan may deposit their securities by March 15.

The first sectional meeting of the Ohio Foundries Association for 1931 will be held at Toledo, Feb. 27, at the Toledo Yacht Club, starting at 12.30 p.m. The speakers will be A. D. Lynch, director of personnel, Ohio Brass Co., Mansfield, who will talk on "Safety Organization;" H. M. Lane of Detroit, who will discuss "General Foundry Practice," and Pat Dwyer, engineering editor of *Foundry*, whose subject will be "Meeting Present-Day Competition."

OBITUARY

EDWIN OTTO MARTING, president, Witherbee, Sherman & Co., Port Henry, N. Y., died at Clifton Springs, N. Y., on Feb. 15. He was born in Berea, Ohio, and was graduated from Baldwin-Wallace College. His first business connection was with the Marting Iron & Steel Co., Ironton, Ohio, as a clerk, and he worked his way up to the vice-presidency. In 1917 he took on the added duties of general manager, when H. A. Marting, president and chairman of the board, relinquished the managership. Later he became president, but resigned five years ago to become president of Witherbee, Sherman & Co.

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SIR ARTHUR J. DORMAN, chairman of the board, Dorman, Long & Co., Ltd., Middlesbrough, England, died at his home in Munthorpe, Yorkshire, England, on Feb. 12, aged 83 years. Sir Arthur entered the iron trade as an apprentice in 1866 and 10 years later, with Albert De Lande, he formed the company of which he was head at the time of his death.

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CHARLES F. LEAR, for the past several years Cleveland district representative for Darwin & Milner, Cleveland, died suddenly on Feb. 6.

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FREDERICK C. BRUNKE, for over 38 years associated with the United States Steel Corpn. and its subsidiaries, died in Buffalo on Feb. 9, aged 55 years. He entered the employ of the Buffalo office of the Carnegie Steel Co. in 1892 and rose from messenger to salesman. When the United States Steel Products Co. opened an office in Toronto in 1911, he was appointed manager. He continued in this capacity until he retired on account of ill-health on Jan. 1, 1931.

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SIR CHARLES PARSONS, inventor of the Parsons steam turbine, died while on a cruise to the West Indies on Feb. 11, aged 77 years. He became a partner in a Gateshead firm in 1883 and the following year built the first steam turbine, which was employed for driving a dynamo. It was not until 1894 that he applied his machine to the propulsion of ships.

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HENRY B. UTLEY, a director of the International Harvester Co., and until his retirement a few weeks ago a vice-president of the company, died Feb. 11, at Beverly Hills, Cal. Mr. Utley was born at Rome, N. Y., in 1855. His family moved to Sterling, Ill., soon thereafter. In 1884 he bought and began the operation of a paper mill at Rock Falls, Ill., and two years later he moved to Chicago and became employed in the McCormick implement factory. He had been connected with the Harvester company, except for a short intermission, since 1886.

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JOHN A. CAVE, secretary and assistant treasurer of the Brown & Sharpe Mfg. Co., Providence, R. I., died on Feb. 5. Mr. Cave entered the service of the company in 1905 as auditor. In 1914 he was elected assistant secretary and 10 years later he was made secretary and assistant treasurer.

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HENRY M. WALLIS, SR., Racine, Wis., pioneer farm machinery and tractor manufacturer, died, Feb. 6, from injuries sustained Nov. 11 in an automobile accident on his stock farm near Racine. He was born June 24, 1851, at White Pigeon, Mich., and became associated with the J. I. Case Plow Works, Racine, in 1883, becoming president in 1892. He organized the Wallis Tractor Co. in 1912. The corporations later were consolidated and several years ago were sold to the Massey-Harris Co., Ltd., Toronto, Ont., whereupon Mr. Wallis retired to devote his time to the breeding of prize cattle.

RALPH M. FRIEND, one of the founders of the Western Iron Stores Co., Milwaukee, jobber in machine tools, mechanics' instruments, shop, factory and mill supplies, died suddenly on Feb. 10 after a heart attack in his office. He was 66 years old. He formerly was president of the company but for several years had served only as treasurer.

EDWARD J. MURPHY, of Houghton & Richards, Inc., Boston, steel importer, died at a Boston hospital on Jan. 31.

NEW TRADE PUBLICATIONS

Pyrometers.—Brown Instrument Co., Philadelphia. Bulletin No. 5, second edition, on Molten Metal Thermocouples, is a 32-page pamphlet which describes a pyrometer which will record temperatures below the surface of metals and give an indication of the temperature within a few seconds.

Fire Brick.—A. P. Green Fire Brick Co., Mexico, Mo. A 32-page illustrated booklet entitled "A. P. Green Mexkoe" gives complete data concerning this company's new fire brick.

Tumbling Barrels.—Barrel Machine Co., Bridgeport, Conn. A 13-page booklet, fully illustrated, describes the various types of tumbling and sandblasting barrels produced by this company. It describes each one in detail, giving full specifications.

Graphite Lubricants.—Acheson Oildag Co., Port Huron, Mich. A 26-page bulletin, illustrated with charts, discusses colloidal graphite, its probable uses and advantages as a lubricant.

Electric Motors.—Sterling Electric Motors, Inc., Los Angeles. Eight-page illustrated bulletin on the Herringbone Rotor, said to provide noiseless operation, eliminate end thrust and the resulting wear on bearings, improve pull-out efficiency and power factor, reduce exciting current, heating, eddy currents and iron losses.

Electric Heating Furnaces.—Ryan-Scully & Co., Philadelphia. Seven-page bulletin No. 4A illustrating and describing types A and B portable box-type electric heating furnaces, which are adaptable to all heat treating operations coming within their capacity.

Oil Burner.—Ryan-Scully & Co., Philadelphia. Seven-page bulletin No. 5 describing and illustrating model D1 low-pressure industrial oil burner, which includes automatic ignition through the hand operated starting switch.

Collapsible Taps. Bickert-Shafer Co., Erie, Pa. Bulletin of seven pages, illustrating several models of collapsible taps made either for hand or machine operation, which are recommended for use in interchangeable manufacture.

Form American Machinery and Tools Institute

In order that those engaged in the machinery and tool industries may have a common meeting ground, the American Machinery and Tools Institute has been organized, and anyone connected with those industries in design, manufacturing or sales capacity is eligible for membership. The executive secretary of the organization is George R. Tuthill, 40 North Wells Street, Chicago.

Officers of the institute are: President, W. R. Mau, Vanadium Alloys Steel Co.; vice-president, F. W. Hack, Cramp Mfg. Corpn.; treasurer, Mark Miles, Miles & Miles.

Local meetings devoted to discussion of design, production or selling of machinery or tools will be held, as well as annual conventions and expositions. Departments to be set up by the institute include: Trade and public relations, trade education, research, advertising and publicity, merchandising, accounting, legal and legislative, and service. The latter will include insurance, credit service, employment service and general consultation. The accounting department embraces cost work, and the research department will collect data showing trade changes and trends. The work of the institute will be performed by committees and the office staff.

National Tube to Build Memphis Warehouse

The National Tube Co., Pittsburgh, subsidiary of the United States Steel Corp., will erect a large river-rail terminal on a 10-acre site on the Mississippi River at Memphis, Tenn. The company is the fifth maker of steel pipe in the Pittsburgh area to establish a warehouse at Memphis, others being the Jones & Laughlin Steel Corpn., Spang, Chalfant & Co., Inc., the Wheeling Steel Corpn., and the Youngstown Sheet & Tube Co.

Complete stocks of steel pipe for distribution to the oil fields of Oklahoma, Texas, Louisiana and Arkansas will be carried at the Memphis terminal, and distribution will be inaugurated at an early date prior to the completion of the terminal. Steel tonnage shipped by river from the Pittsburgh district to Memphis during 1930 totaled more than 300,000 tons, according to the Memphis Chamber of Commerce.

New York Shipbuilding Co. Awarded Scout Cruiser

WASHINGTON, Feb. 17.—The Navy Department has awarded the contract for the building of light cruiser No. 37 to the New York Shipbuilding Co., Camden, N. J., whose bid of $10,150,000 was low. The Navy Department has also announced that the cruiser Denver has been placed out of commission and will be sold for scrap prior to July 1, 1932.

New Width, Length Extras on Galvanized Sheets

The American Sheet & Tin Plate Co. has announced new width and length extras on galvanized sheets, following the adoption last summer of similar extras on black sheets. It is expected that other producers of galvanized sheets will follow the American Sheet & Tin Plate Co. in putting these into immediate effect. The extras are given in a subjoined table.

Width and Length Extras per 100 Lb. on Galvanized Sheets

Widths	12 Gage and Heavier	13–15	16	17–18	19–21	22	23–24	25–26	27	28	29–30
Under 32 to 36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.20	0.20
" 36 to 38	0.00	0.00	0.05	0.05	0.10	0.20	0.25	0.30	0.40	0.50	"
" 38 to 40	0.00	0.00	0.05	0.05	0.15	0.30	0.35	0.45	0.50	0.65	"
" 40 to 42	0.05	0.05	0.05	0.05	0.15	0.35	0.45	0.65	0.70	"	"
" 42 to 44	0.10	0.10	0.10	0.10	0.30	0.45	0.55	0.75	0.80	"	"
" 44 to 46	0.20	0.20	0.20	0.20	0.35	0.55	0.65	0.85	1.00	"	"
" 46 to 48	0.20	0.20	0.20	0.25	0.40	0.65	0.75	1.00	1.25	"	"
" 48 to 50	0.20	0.20	0.20	0.35	0.45	0.80	0.90	"	"	"	"
" 50 to 52	0.35	0.35	0.35	0.40	0.50	0.90	1.00	"	"	"	"
" 52 to 54	0.40	0.40	0.45	0.55	0.75	1.15	"	"	"	"	"
Under 24 to 12	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.25	0.25	0.25	0.25
" 12 to 6	0.25	0.25	0.25	0.30	0.30	0.30	0.30	0.35	0.35	0.35	0.35
Lengths											
Over 124 to 144	0.00	0.00	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
" 144 to 156	0.25	0.25	0.25	0.50	0.50	0.50	"	"	"	"	"
" 156 to 168	0.50	0.50	0.50	0.75	0.75	0.75	"	"	"	"	"
" 168 to 192	0.75	0.75	0.75	"	"	"	"	"	"	"	"
" 192 to 216	0.75	"	"	"	"	"	"	"	"	"	"
Under 60 to 30	0.10	0.10	0.10	0.20	0.20	0.20	0.20	0.25	0.25	0.25	0.25
" 30 to 18	0.20	0.20	0.20	0.30	0.30	0.30	0.30	0.35	0.35	0.35	0.35

Extras for lengths over 216 in. in 12 gage and heavier and under 18 in. in all gages will be furnished by mills upon application.

To Simplify Cupola, Tap-Out and Slag-Hole Blocks

The joint committee on foundry refractories, sponsored by the American Ceramic Society and the American Foundrymen's Association, recently requested the cooperative services of the division of simplified practice of the United States Bureau of Standards with the view to establishing a simplified practice recommendation covering the sizes and shapes of cupola blocks, tap-out blocks and slag-hole blocks.

In compliance with this request, a questionnaire has been prepared and is now being circulated among the manufacturers of this product requesting that they submit to the division, for compilation, a list of refractory shapes manufactured for cast iron foundries, together with their dimensions and the number manufactured a year. The manufacturers have also been requested to furnish a list of sizes of tap-out and slag-hole blocks, along with sketches showing the general design of each.

Long-Time Tests for Creep More Valuable

In a report which will appear in the February number of the United States Bureau of Standards *Journal of Research*, results are given of "short-time" tension tests at different temperatures for 12 commercial alloys of iron with varying proportions of nickel, chromium, tungsten, vanadium, molybdenum or aluminum in the wrought condition, either forged or rolled, after which operation many had been heat treated.

A study was also made of the effect of deformation on the structural stability and subsequent hardness at ordinary temperatures. In general, the results showed that the "long-time" or flow test cannot be satisfactorily replaced by the simpler short-time test, although the latter is very valuable for a preliminary study.

Measurement of the "flow" or "creep" in a tensile test specimen loaded at an elevated temperature for several hundred hours is regarded as the best test by which materials may be judged for the usual service condition, says the bureau. This test requires long periods of time to give results, which is in direct contrast to the "short-time" test in which a tensile specimen at an elevated temperature is broken in a relatively short period of time by the application of a steadily increasing load. This latter type of test affords preliminary information with a great saving of time in the study and development of alloys for service at high temperatures.

Woodruff Key Standards Approved

Standard dimensions for Woodruff keys, keyways and cutters have been approved by the American Standards Association following submittal by the American Society of Mechanical Engineers, which is in charge of the technical committee on this project.

The standard covers a series of 27 keys of various thicknesses having radii of curvatures ranging from ⅛ to ¾ in. This series is said to cover 90 per cent of the requirements of the entire consuming industry. A simplified method of indicating Woodruff key sizes has been incorporated. Instead of using an unrelated series of numbers and letters or combinations of the two, a system has been developed in which one series of digits represents the nominal width of the keyslot or cutter, rising by 1/16-in. increments, and a second series of digits represents the nominal diameter of the keyslot or cutter rising by ¼-in. increments. Two numbers, one from each series in the order stated above, give the number assigned to the particular standard key. Copies of the standard may be obtained from either the A.S.A. or the A.S.M.E., 29 West Thirty-ninth Street, New York.

New England Council, Boston, is distributing to its members a series of leaflets designed to show how profits may be increased by modern methods of handling materials. The series consists of 10 problems, each of which is treated in a single leaflet. Questions are asked in each case to stimulate the thinking of those who receive this material.

What Depression Has Taught

Dr. Julius Klein Points Out Lessons to Be Learned from Present Situation

"AS we emerge from the depression—and authoritative testimony indicates that the upward climb is at last under way—there is a growing realization that once more, as in every period of trial, business has learned several salutary lessons. It has been through a broadening, though trying, experience, a grueling test in a truly relentless crucible," said Dr. Julius Klein, Assistant Secretary of Commerce, before the Manufacturers Association of Bridgeport, Conn., Feb. 12.

"Above all else," he continued, "perhaps this crisis has revealed, as none of its predecessors had, how closely interwoven the economic fabric of this nation has become during these post-war years. We can now appreciate as never before the vastly more sensitive interdependence of our business activities everywhere. And that applies not simply within our borders, but in every remote market and port around the seven seas.

"This binding power of business was clearly stated by that lonely, rugged seer who 70 years ago led this nation through trials, economic as well as political, such as would make our own recent business difficulties seem puny indeed. In one of his first debates with Douglas, Lincoln observed that 'commerce brings us together and makes us better friends. . . . These mutual commercial accommodations are the cements which bind together the different parts of this Union. . . . They are the props of the house tending always to hold it up.' And if that was true two generations ago, it certainly has become infinitely more convincing in this day of a vastly more intensive, closely integrated economic mechanism. Business is no longer on the lone-wolf, every-man-for-himself basis.

What the Depression Has Taught for Future Guidance

"It might be interesting to tabulate very briefly a few of these impressions which come to mind as we contemplate the difficult road over which business has had to make its painful way during the past few months. The tabulation of a decalog of the depression, comprising some of the outstanding factors, might not be inopportune for future reference.

"1. Don't blame the depression for everything which has marred the tranquillity of the economic scene since 1929. The collapse of many parts of the business structure has had widespread repercussions, but there are other and in many cases deeper-seated defects having nothing to do with the regrettable episodes of the past 16 months. Lack of vision, archaic methods, antiquated policies, within individual firms and trades, have all contributed toward weakening those involved so that when the depression came it was but the last straw, the final episode in a long sequence of causes, rather than the fundamental reason for current difficulty.

"2. Don't compare peaks with slumps. Both are abnormalities. The more we flatten out the peaks, the better will be our control of the slumps.

"3. Don't fall into the fallacy so general among European industrialists of expecting the wage earner to bear the brunt of the readjustment. Before resorting to that extremity, let industry be sure that every other one has been exhausted. There is plenty of slack elsewhere—careless production, inefficient management, slipshod selling. Talk of drastic slashes in American living standards and 'permanent lows' in wages borders closely on economic lunacy.

"4. Don't cut loose from associated activities in business. Such short-sighted 'economy' is the sheerest extravagance at this particular stage of business readjustment. There never was a time in the last 10 years when cooperation was more invaluable. No one shoves off in a rowboat from a liner in a mid-Atlantic storm to save passage money.

"5. Don't ignore the amazing power of the new technology. No peril is quite so disastrous in business these days as a smug, self-satisfied assurance that present technique in production will be permanent. Our engineers, our chemists, our inventors, have never shown such relentless zeal as at present. They have largely been responsible for lifting the country out of every preceding crisis. Those industrialists who cling closely to them right now will have good reason to be thankful.

"6. Don't cut marketing research. Our gravest deficiency still lies in the field of defective distribution. Our major business problem these days is not what can be made, but what can be sold. If the billions wasted there could be salvaged, even in a modest proportion this year, it will be the largest single contribution to our recovery. Closely associated with this is the need of sustained, far-sighted advertising as an invaluable adjunct to more effective and economical distribution. The stimulus, not of blatant ballyhoo, but of well-founded publicity, was never more necessary than now. There can be no recovery of business with lagging demand or unwarranted timidity of consumption.

"7. Don't overlook the stabilizing value of foreign markets. They cannot be exploited on short notice. Many a firm has survived this recent storm because its executives had the foresight in fair weather to plant an anchor in two or three carefully selected markets far overseas.

"8. Don't fall again into the perils of mass mania, the delusion that the sole purpose of business is 'busy-ness.' Quantity operations whether in output or distribution are by no means an invariable assurance of quantity profits. The latter are indeed elusive unless that fateful margin between income and outgo is thoroughly sustained and respected (not merely suspected). The dinosaur was a first-class example of mass production. But he and his kind have all been quite dead for several million years because too much of their 'mass' was below their ears.

"9. Don't overlook the perils of obsolete equipment. It is wiser to have the junk heap outside the factory than in it. Nearly half (48 per cent, to be exact) the machinery in our own American factories today is over 10 years old. The paralysis of advancing senility is all the more dangerous because its stealthy approach is so painless, so easy.

"10. Don't be stampeded by unfounded rumors. They are the fodder on which crises flourish. In these days of abundant, accurate statistical data and superb communication facilities, there is no longer any valid excuse for mischievous gossip-peddling among otherwise sensible business executives. The mendacity of every irresponsible, dangerous rumor can be and should be instantly squelched. And it will be, as long as ours is still a business leadership of men, not mice. The time for the calamity complex has passed."

Otis Steel Co. Orders Electrical Equipment

The Otis Steel Co., Cleveland, has placed a contract with the General Electric Co. for electrical equipment required for its new continuous sheet mill. The amount involved is approximately $600,000. The contract includes a 800 hp. slip ring motor, a 4500 hp., 11,000-volt synchronous motor, three 3500 hp., 175 to 350 r.p.m., 600-volt d.c. motors, one 250 hp., 200 to 400 r.p.m., 600-volt d.c. motor, control for these motors and for 1200, 1600, 2000 and 3000 hp. motors now in the plant, two 4000-kw. motor generator sets and control and switchboard and ventilating equipment, two 800 hp. pump motors and a bank of 3700-kva. transformers.

Machine Tool Business Fairly Promising

Some Sections That Did Not Experience Improvement in January Feel It Now

SPOTTY improvement in machine tool sales in January was not sufficient to bring an upturn in such business for the country as a whole. The monthly index figure announced by the National Machine Tool Builders' Association is 66.9, compared with 68.8 for December, and the three months' moving average has declined to 65.3, against 73.1 at the end of December.

The National Machine Tool Builders' Association divides its returns on sales into three classes, one of which, Class A, showed an increase in January, which was more than offset by declines in the other two classes. It is noted, however, that the rate of decline has slowed down.

Reports to THE IRON AGE from various market centers indicate that some sections which did not experience much of a gain, if any, in sales last month are now doing more business. No substantial buying movement is yet in sight, however.

Railroad inquiries are of primary interest. The Chicago Great Western has come into the market for nine machines, and the Delaware & Hudson is inquiring for several.

One of the largest industrial orders was from the Babcock & Wilcox Co. covering a half dozen lathes, milling machines and boring machines for its Barberton, Ohio, plant.

Foreign business includes an order for 20 small turret lathes from the Amtorg Trading Corpn. for Russia.

New York

For the first half of February, machine tool business in this territory made a favorable comparison with the January average, but it is doubtful whether there was a gain. Machine tool sellers continue to feel encouraged by the interest that buyers are taking. Inquiries are in fairly good volume. The Delaware & Hudson Railroad has issued an inquiry for several tools.

Cleveland

The machine tool market in this territory showed less life the past week than in the previous week. The only sizable order came from the Babcock & Wilcox Co. for about a half dozen lathes, milling machines and boring machines for its Barberton, Ohio, plant. A new order for 20 small turret lathes was placed by the Amtorg Trading Corpn. with a Cleveland manufacturer. This Russian inquiry had been pending for some time. Local machine tool manufacturers report a fair volume of inquiry from other districts, but business is slow in being closed.

Chicago

Probably one of the most important factors in the machine tool trade is that estimating and designing departments are busier. So far as inquiries and sales are concerned, there has been little change in this district since the first of the month. It is noted, however, that many users normally interested only in new equipment are now making purchases in the used machine market. Added to the pending lists by the Santa Fe, Illinois Steel Co. and Bucyrus-Erie at Milwaukee, are requests for prices from the Chicago Great Western for nine machines. The International Harvester Co. has ordered two lathes and plants closely allied with the implement business are showing greater interest in machine tools. The Western Electric Co. is taking prices on a few items and the new Wells Junior High School, Chicago, promises business later in the year.

Chicago Great Western list:

One 4-ft. radial drill.
One 36-in. x 16-ft. lathe.
One 12-in. and one 15-in. floor grinder.
One 16-in. drill press.
One 36-in. shaper.
One 24-in. vertical turret lathe.
One 20-in. x 8-ft. lathe.
One 22-in. turning lathe.

New England

Current sales of new and used tools are confined to small equipment. Weekly bookings, however, are running ahead of those in January. A large amount of business is hanging over the market. There is nothing at the moment, however, to indicate when a substantial buying movement will start.

Small tools are selling better than in several months, but the market is by no means active.

Pittsburgh

Most dealers in this district can still report a slightly better run of orders than in January, but aggregate business leaves much to be desired. Encouragement arises principally from the mounting volume of inquiries. Single tools predominate; many requests for estimates are unsolicited. Large lists from industries and railroads are almost wholly lacking. The last list of the Westinghouse Electric & Mfg. Co. contained less than 20 tools and is representative of industrial buyers as a whole who are ordinarily inquiring for much more equipment.

Makers of heavy machinery and equipment in this district continue to operate at a good rate, but no new orders of size have come out recently. A manufacturer of pipe is reported to have ordered a new seamless tube mill from a British builder.

Cincinnati

Demand for machine tools in this district continues to reflect the hesitancy of users to enter the market. New business is for single tools and orders are few. Inquiry still is good. Production is in keeping with demand, although no further reduction in operations has been reported for the past month.

Milwaukee

Further gains in machine tool orders have been made during the past week, and the character and volume of inquiry is for a relatively excellent month's business. Most of the purchases are of single items, but these represent a fair aggregate. Business is coming from a wide variety of industries, with the automobile trade becoming an increasing factor. Sales of recently developed high-capacity production tools are better than expected. The demand for used tools is fair.

New York

IN connection with school expansion program during 1931, covering 85 new structures to cost about $65,000,000, Board of Education, New York, plans erection of five industrial, vocational and continuation schools, two in Brooklyn, one in New York, one in Queens and one on Staten Island, each to cost over $1,000,000 with equipment. A new graphic arts school will also be built in Brooklyn. Not included in above program, board has just awarded general contract to Royal Rice Co., Inc., 139 East Fifty-seventh Street, for Bronx continuation training school, to cost $1,606,500, of which close to $1,000,000 will be used for equipment. Walter C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect for board.

Standard Sealing Equipment Corpn., 42-27 Thirty-third Street, Long Island City, manufacturer of automatic sealing and packing machinery, has leased one-story factory, totaling 20,000 sq. ft. floor space, for expansion.

Long Island Lighting Co., 50 Church Street, New York, is considering one-story equipment storage and distributing plant at Northport, L. I., to cost about $70,000 with equipment.

Associated Oil Co., 17 Battery Place, New York, affiliated with Tide Water Oil Co. same address, has approved plans for pipe line from producing wells in San Joaquin Valley district, Cal., to terminal at Monterey, Cal., about 150 miles, for gasoline transmission, including booster pumping stations and other equipment, to cost over $1,500,000. Western offices of Associated company are in Pacific Electric Building, Los Angeles.

A. T. W. Corpn., Brewster, N. Y., care of Hugh Heradon, Jr., Brewster, recently organized by Mr. Heradon and associates plans operation of local factory for manufacture of aircraft and parts. Emil Roth, Jr., Fayetteville, N. Y., is interested in new organization.

Hyman's New York & Jamaica Express, Inc., 142-01 101st Avenue, Jamaica, L. I., has plans for a one-story service garage and repair shop for motor trucks, 100 x 200 ft., to cost about $50,000 with equipment. Theodore Guterman, 16 Nassau Street, Brooklyn, is architect and engineer.

Jones & Larson Corpn., Maspeth, L. I., manufacturer of steel buildings, has plans for new one-story steel fabricating shop, 100 x 100 ft., to cost about $45,000 with equipment.

Commonwealth & Southern Corpn., 20 Pine Street, New York, operating electric light and power properties in several states, is arranging fund of about $45,000,000 for expansion and improvements. About $36,000,000 will be used for electric light and power properties, $4,000,000 for gas properties and remainder for other operating departments. Company has work under way on hydroelectric power development on Muskegon River, Mich., and station of similar type on Tocoa River, Ga., latter to be known as Blue Ridge hydroelectric power development.

Municipal Sanitation Department, 3th nicipal Building, New York, has taken out a permit for a one-story steam-operated power plant on Ward's Island, 51 x 95 ft., to cost about $112,000 with equipment; also for pumping plants and other units, including blower house, to cost over $2,700,000 with machinery. Sloan & Robertson, 420 Lexington Avenue, are architects.

Board of Education, 1253 Clinton Avenue, Irvington, N. J., plans installation of manual training equipment in new three-story junior high school to cost about $100,000, for which general contract has been let to Louis Dentsch Inc., 852 Bergen Street, Newark. Victor H. Stromboch, 1243 Springfield Avenue, Irvington, is architect.

Unique Art Mfg. Co., 196 Waverly Avenue, Newark, manufacturer of mechanical toys, has plans for a two-story addition, to cost over $35,000 with equipment. Saul Shaw & Co., 24 Commerce Street, are architects and engineers.

Board of Education, City Hall, Newark, plans installation of manual training equipment in new multi-story junior and senior high school on Chancellor Avenue, to cost $1,050,000 with equipment. Guilbert & Betelle, Chamber of Commerce Building, are architects.

Royal Silver Mfg. Co., Newark, has been organized with capital of $100,000 to take over and expand company of same name, with plant at 201 Mulberry Street, manufacturer of silver and plated ware products. Incorporators include Samuel T. Goldsmith and Frederick J. Klinge.

Booth Engineering Co., Ltd., branch of Los Angeles, has leased building at Summit and Bleecker Streets, Newark, N. J., for manufacture of baking equipment, slicing machinery, knife grinders and conveyors.

INDUSTRIAL CONSTRUCTION

Projects Announced During Week Aggregate Over $180,000,000

THE total of proposed expenditures for current and extending construction announced during the past week is $181,217,000. This will involve industrial machinery and equipment and is exclusive of road, bridge and commercial or residential building construction.

New schools aggregate $77,611,000. Of this, $65,000,000 is represented by the 1931 school expansion program of New York City, which calls for 85 new structures with the necessary equipment.

Oil and gas pipe lines announced for construction amount to $6,400,000, which is slightly under the total for the week preceding; $2,000,000 of the total for oil and gas lines is represented by a project of the Memphis Natural Gas Co., embracing the construction of a pipe line to Covington, Tenn. Compressor stations and other structures will be required.

The summary of current projects for the week for immediate construction is as follows:

Public utilities and power plants	$462,000
Industrial plants	7,469,000
Metal-working plants	2,544,000
Municipal improvements and airports	2,231,000
Total	$12,706,000

In addition to the above, appropriations totaling $84,500,000 for construction by utilities which will extend through 1931 were announced during the week.

Among the larger projects for industrial plant construction is a $1,000,000 mill addition by the Tennessee Eastman Corpn., a subsidiary of Eastman Kodak Co. This will enlarge the cellulose products facilities of the plant at Kingsport, Tenn.

A sharp increase in the total for construction of metal-working plants is a feature of the week's construction news. Twenty projects of this class are recorded. The largest is a $700,000 appropriation by Sharpsville Boiler Works, Sharpsville, Pa., for plant addition and new equipment to be used for the production of pumping machinery and parts.

Among extending public utility projects scheduled for completion during the year is one of $45,000,000 by the Commonwealth & Southern Corpn. of New York. This will involve hydroelectric developments and extensions to present electric power and light properties in several states.

South Atlantic

AN appropriation of $2,000,000 has been authorized by Virginia Electric & Power Co., Richmond, Va., together with fund of $2,000,000 available from 1930 budget, making total of $4,000,000, for expansion and improvements to power plants and system, of which about $1,000,000 will be expended in Richmond district, including Fredericksburg and Roanoke. Rapids, for transmission and distributing lines, power substation extensions, equipment for generating plants, etc. Company engineering department will be in charge.

Superintendent of Lighthouses, Baltimore, is asking bids until Feb. 27 for watertube boilers and oil-burning equipment for marine service.

Clark Thread Co., 2600 Ogden Street, Newark, N. J., has awarded general contract to A. K. Adams Co., Atlanta, Ga., for initial units of new mill at St. Augustell, near Atlanta, consisting of three-story unit, 225 x 500 ft., power house and other buildings, to cost over $1,000,000 with machinery. Other structures will be built later to cost close to like amount, or total investment of $2,000,000. J. E. Sirrine & Co., Greenville, S. C., are architects and engineers.

General Purchasing Officer, Panama Canal, Washington, will receive bids until March 7 for traveling cranes, tackle blocks, chain, files, hammers, wire rope, tubing and other mechanical equipment.

Swift & Co., Union Stock Yards, Chicago, has asked bids on general contract for addition to branch plant at Charlotte, N. C., two stories, 35 x 75 ft., to cost close to $40,000 with equipment.

Inland Service Corps., Fredericksburg, Va., an interest of Inland Utilities, Inc., 222 North Third Street, Harrisburg, Pa., is considering new ice-manufacturing plant at Fredericksburg, to cost about $80,000 with machinery.

Southern Spring Bed Co., 290 Hunter Street, S. E., Atlanta, Ga., has awarded general contract to Pittman Construction Co., Rhodes Building, for plant extension and improvements.

Board of School Commissioners, High Point, N. C., plans installation of manual training equipment in two and three-story and basement junior high school to cost about $225,000, for which general contract has been let R. K. Stewart & Son, Smith Hamilton Street. Harry Barton, Jefferson Building, Greensboro, S. C., is architect.

Iron Mountain Mining & Development Corps., care of O. J. Graham, 1709 Connecticut Avenue, N. W., Washington, recently organized by Mr. Graham and associates, has taken over 450 acres of manganese properties near Clifton Forge, Va., and plans installation of mining, conveying and other equipment. Immediate output will be shipped in crude state. Later company plans construction of a mill for separating, refining, etc. W. L. Whitesell, Iron Gate, Va., will be an official of new company, which will be represented by Williams & Mullen, American National Bank Building, Richmond, Va., attorneys.

Aresto Co., Union Avenue, Baltimore, manufacturer of non-explosive tanks, flame arrestors and kindred products, contemplates merger with American Pump & Valve Co., Merchant Street, Alexandria, manufacturer of pumping machinery, parts, etc. Baltimore plant will be removed to last-noted place and capacity increased.

Bureau of Yards and Docks, Navy Department, Washington, is asking bids until March 11 for motor-generator sets and switchboard for Boston Navy Yard, to cost $60,000; until March 18 for a boiler plant at Quantico, Va. Bids are being asked, no closing date stated, for installing boilers, stokers and auxiliary equipment at Washington Navy Yard, to cost $110,000; bids, no closing date stated, for a turbo-alternator at Great Lakes, Ill., to cost $25,000, and for extension to seaplane hangar at last-noted place, to cost $20,000; also, no closing date stated, for an electric bridge crane in building 115, at Portsmouth, N. H., Navy Yard, to cost $36,000.

Buffalo

PLANS are under way by Niagara-Hudson Power Corpn., Electric Building, Buffalo, for a two-story automobile service, repair and garage building, 100 x 200 ft., at Syracuse, N. Y., to cost close to $100,000 with equipment. Bley & Lyman, 505 Delaware Street, Syracuse, are architects.

Massey-Harris Co., Batavia, N. Y., manufacturer of agricultural implements and equipment, is planning expansion at local foundries and will concentrate production of gray iron and malleable iron castings at this point. Headquarters are at Racine, Wis. William S. Milne is general superintendent at Batavia.

Mathieson Alkali Works, Inc., Buffalo Avenue, Niagara Falls, N. Y., is carrying out expansion at local plant, including new unit for production of high test hypochlorite, scheduled for capacity service in July. Company also has work under way on a dry ice manufacturing plant at Saltville, Va., to be ready for production in April or May.

Prest-O-Lite Co., 30 East Forty-second Street, New York, a subsidiary of Union Carbide & Carbon Corpn., same address, contemplates a new acetylene gas plant at Syracuse, N. Y., including tank storage and distributing facilities, to cost close to $60,000 with equipment. Company engineering department will be in charge.

Brockway Machine Bottle Co., Clinton, N. Y., with main plant at Brockway, Pa., has arranged for increase in capital from $500,000 to $750,000 for expansion.

John F. Fitzgerald, Athol Springs, N. Y., has organized Great Lakes Boiler Co., and plans operation of local factory for production of boilers, tanks and kindred products.

New England

PLANS are under way by Connecticut Light & Power Co., Hartford, Conn., for a steam power plant at Bristol, Conn., to cost over $50,000 with equipment. Present local power plant on Highland Court will be dismantled and property used for electric power substation. Harold A. Hayden, Bristol, is architect.

Foster Grant Co., Leominster, Mass., manufacturer of celluloid and kindred products, is considering two-story addition, to cost close to $60,000 with equipment.

Maxim Silencer Co., Hartford, Conn., has perfected a new window silencer, based on an adaptation of Maxim gun silencer, and will arrange department for quantity production of new equipment.

Board of Works, New Haven, Conn., has awarded general contract to Fusco & Amatruda, Amity Road, for new buildings at municipal airport at Morris Cove, to cost over $45,000 with equipment. Westcott & Mapes, New Haven, are engineers.

Board of Education, Swampscott, Mass., is considering installation of manual training equipment in new multi-story high school, to cost about $300,000, for which plans are being drawn by Cram & Ferguson, 248 Boylston Street, Boston, architects. H. S. Baldwin is chairman of building committee.

Boston Consolidated Gas Co., 100 Arlington Street, Boston, has applied for permission to issue additional capital stock totaling $6,500,000, part of fund to be used for extensions and improvements in artifical gas plants and system. Tenney Barnum is president.

A. J. Lundri Co., East Lyme, Conn., is planning establishment of boat-building and repair plant on waterfront, to be ready for service in spring.

Fire Department, Springfield, Mass., William H. Daggett, Court Street, fire chief, is considering erection of onestory repair shop and signal station, to cost over $30,000 with equipment.

War Department, Washington, has been authorized to lease Governors Island, Boston harbor, Boston, to city as a municipal airport, and Public Works Department, City Hall Annex, will have plans drawn for hangars, repair shops and other field units. Entire project will cost over $500,000 with equipment.

Connecticut Boiler & Mfg. Co., Stratford, Conn., has changed its name to Connecticut Marine Boiler Works, Inc.

Plant of Waterbury Steel Ball Co., Waterbury, Conn., recently damaged by fire, is being repaired. Hardening equipment will be purchased.

City of New Canaan, Conn., has closed bids on a junior high school to contain manual training shops, to cost $250,000 with equipment.

Bids close March 4 on a Newport, R. I., Naval Topedo Station assembling plant addition to cost $125,000 with equipment.

Philadelphia

BIDS are being asked until March 4 by Government Department of Supplies, Philadelphia, for three-story and basement addition to shops of Marine Corps, to cost $300,000 with equipment. Bids are also being asked until Feb. 25 for a one-story engine-testing shop at Philadelphia Navy Yard.

Richardson & Boynton Co., 260 Fifth Avenue, New York, manufacturer of furnaces, heating equipment, etc., with main plant at Dover, N. J., has leased space in new Terminal Commerce Building, Philadelphia, for factory branch, storage and distributing plant.

Suntex Chemical Co., 600 Delaware Avenue, Philadelphia, has leased for expansion three-story building at York and American Streets, totaling about 12,000 sq. ft. floor space. Present factory will be removed to new location and additional equipment installed.

Edward Merchant, secretary and business manager, Board of Public Education, Keystone Building, Philadelphia, is asking bids until March 3 for steel lockers and other equipment.

Bureau of Water, Department of Public

Works, City Hall Annex, Philadelphia, Alexander Murdoch, director, is asking bids until Feb. 26 for switchgear and auxiliary equipment at Belmont pumping station, riveted pipe, valves, pilot tube meters, and other equipment.

Borough School Board, East Mauch Chunk, Pa., is considering installation of manual training equipment in new one-story and basement high school, 125 x 200 ft., to cost over $125,000 with equipment. Bids have been asked on general contract. W. Marshall Hughes, Reading, Pa., is architect.

Servusoil Co., 307 South Warren Street, Trenton, N. J., has purchased about 13 acres on Delaware River waterfront as site for new bulk oil storage and distributing plant, to cost about $80,000 with equipment. Henry Welling is head.

Green Brothers Co., Springfield, Mass., manufacturer of yeast, has leased former plant of Bergougnan Rubber Co., Trenton, N. J., consisting of three two-story factories on 3-acre tract, for new plant. Plant and executive offices at Springfield will be continued. Project will cost over $100,000. Samuel Green is president. Robert K. Prince, company engineer, will be in charge of Trenton plant.

Swann Corpn., 420 Lexington Avenue, New York, with main offices at Birmingham, operating Swann Chemical Co. and other interests, has acquired Wilckes, Martin & Wilckes Co., 1500 Pine Street, Camden, N. J., manufacturer of lamp black, phosphates and kindred products. Purchasing company will continue operation in present name as company division, and will develop different industrial products of organization. Ferdinand Wilckes, heretofore president of acquired company, will become a member of board of directors of Swann Corpn.

E. J. Quigley, State purchasing agent, State House, Trenton, N. J., will receive bids until Feb. 27 for portable pumping machinery.

Board of Education, Souderton, Pa., contemplates installation of manual training equipment in new multi-story high school, to cost about $160,000, for which plans are being drawn by C. M. Talley, 14 West Broad Street, architect.

School Board, West Fallowfield Township, Cochranville, Pa., contemplates installation of manual training facilities in new junior-senior high school at Cochranville, for which bids are being asked on general contract, including mechanical equipment, until Feb. 27. Ralph P. Minich, 27 South High Street, West Chester, Pa., is architect.

Milwaukee

CONTRACTS will be placed early next week for one-story machine shop extension, 60 x 80 ft., for Fritzke & Icke, Inc., general machinist, 338 Davidson Street. Total investment will be about $25,000.

Central Public Service Corpn., Sidnaw, Mich., has placed general contract with Price Brothers, Dayton, Ohio, for new power dam, 450 ft. long and 34 ft. high, across Sturgeon River at Hersey Rapids, near Baraga, Mich. Power plant and equipment contracts will be placed later. Holland, Ackerman & Holland, 55 West Jackson Boulevard, Chicago, are consulting engineers in charge.

General Instrument Co., LaCrosse, Wis., recently organized with $50,000 capital by former executives of LaCrosse division, Motometer Gauge & Equipment Co., has leased plant at foot of Market Street and plans to be in production by March 1 on general line of automobile dashboard devices and industrial thermometers and pressure gages. L. A. Carey is president, H. T. Owens, vice-president, R. L. Carey, treasurer, and A. H. Zisellsberger, secretary and manager.

Riverside Paper Corpn., 800 South Law Street, Appleton, Wis., has engaged Charles A. Cahill & Sons, consulting engineers, 724 East Mason Street, Milwaukee, to make power survey in view of improvements and replacements.

Waukesha Pattern Works, 139 North Street, Waukesha, Wis., will break ground March 2 for one-story extension, 40 x 80 ft., designed by Frank D. Chase, Inc., 1709 North Michigan Avenue, Chicago.

Manistique Pulp & Paper Co., Manistique, Mich., has plans for new 600-lb. high pressure power plant containing two turbines and will electrify several grinder units. No estimate of cost is as yet available. Edward Sheahan is general manager.

M. Tullgren & Sons Co., architect, 2243 North Prospect Avenue, Milwaukee, expects to complete plans by March 1 for new $1,000,000 high school for village of Whitefish Bay, Milwaukee suburb, and bids will be called shortly thereafter. Structure will be 250 x 300 ft., three stories and basement, with two gymnasium shops. Heating panel requires four boilers with oil burners. W. V. Kluth is secretary of school district.

Peninsular Coal Co., 918 Tower Avenue, Superior, Wis., plans $75,000 improvement in handling equipment for its No. 1 dock at Allouez Bay, Superior.

Common Council, Oconto, Wis., has engaged Gordon & Bulot, consulting engineers, 53 West Jackson Boulevard, Chicago, to prepare plans for $45,000 municipal waterworks improvement, including deep well pumps with electric motor drive and automatic control, new standpipe, etc. P. T. Mezzenen is city clerk.

Detroit

APPROPRIATION of $18,500,195 has been authorized by Consumers Power Co., Jackson, Mich., for extensions and improvements to power plants and system, including gas properties. Work is under way on a new artificial gas plant at Royal Oak, Mich., to cost over $200,000. Company engineering department will be in charge.

Manistique Pulp & Paper Co., Manistique, Mich., is planning extensions to power plant, with installation of new boiler, high-pressure turbine-generator and auxiliary equipment, for which bids will soon be asked. Company is considering electrification of grinders and other equipment at paper mill. Edward Sheahan is general manager.

Skidmore Corpn., Vine Street, St. Joseph, Mich., has been formed by H. Skidmore and associates, with capital of $25,000, to operate a local plant for manufacture of hydraulic machinery, pumping equipment, etc. H. A. Lally, Benton Harbor, Mich., is interested in new company.

Detroit Metallic Gasket Co., 2950 Grand Avenue, Detroit, has awarded general contract to Campbell Construction Co., 6232 Michigan Avenue, for a one-story addition, including alterations in present plant.

Buhl Aircraft Co., Marysville, Mich., is developing a new low-priced commercial airplane with fuselage entirely of metal, powered by a 40-hp. motor, and plans to carry out quantity production during spring. Elmer Tierney is chief engineer.

United States Lake Survey Office, Detroit, is asking bids until March 3 for two 10-kw. electric generating units.

In connection with proposed removal of Cleveland plant of Industrial Brownhoist Corpn., Bay City, Mich., to latter city and consolidation of manufacture at that point, company will carry out expansion at Bay City works, including erection of new plant units, to cost close to $150,000.

Automatic Gauge Engineering Co., Marysville, Mich., whose plant was recently sold at public auction to Great Lakes Aircraft Corpn., will be reorganized. Engineering company and American Cirrus Engines, Inc., are both subsidiaries of Allied Motor Industries, Inc. W. B. Blackbeck, who was secretary-treasurer of American Cirrus Engines, Inc., is at head of new company and in charge of reorganization.

Cincinnati

BIDS are being asked on general contract by Dayton Green House Mfg. Co., South Perry Street, Dayton, Ohio, for one and two-story plant, 60 x 160 ft. and 30 x 60 ft., respectively, to cost about $40,000 with equipment. Geier & Scoffer, Ludlow Arcade Building, are architects.

Louisville Gas & Electric Co., Louisville, is disposing of a bond issue of $6,000,000, part of fund to be used for extensions and improvements to power plants and system.

Tennessee Eastman Corpn., Kingsport, Tenn., manufacturer of cellulose products, subsidiary of Eastman Kodak Co., Kodak Park, Rochester, N. Y., has plans for new multi-story mill addition, 90 x 300 ft., to cost close to $1,500,000 with machinery. Plant is scheduled to be ready for service in October. Company engineering department is in charge.

Memphis Natural Gas Co., Memphis, Tenn., is planning construction of pipe line to Covington, Tenn., and vicinity, for natural gas supply, to cost over $2,000,000 with compressor stations and other structures. Company engineering department will be in charge. Appalachian Gas Corpn., Memphis, an affiliated organization, operating natural gas properties, is disposing of a bond issue of $1,750,000, part of proceeds to be used for extensions and improvements in plants and system. Company is arranging for purchase of natural gas properties in 15 counties of Ohio and will carry out development program. Acquisition will include Trans-Ohio Gas Corpn., with system at Mansfield, Ohio, and vicinity. Properties will be operated by Commonwealth Gas Corpn., an affiliated interest.

Kentucky Power & Light Co., Maysville, Ky., is planning construction of necessary ice-manufacturing and cold storage plant, to cost about $85,000 with machinery.

Contracting Officer, Wright Field, Dayton, Ohio, is asking bids until Feb. 25 for a quantity of starter assemblies; until Feb. 24 for 120 ratchet-bar assemblies, and until March 2 for 70 propeller blades.

United States Engineer Office, Memphis, Tenn., will receive bids until Feb.

24 for one 15-kw. steam engine-driven generating set; on Feb. 25 for a similar set.

Pittsburgh

BIDS will be received by Bertram L. Succop, director, Department of Supplies, City-County Building, Pittsburgh, until Feb. 21 for two loaders, two asphalt rollers, gate valves and gate valve parts, underground cable, special castings and other equipment.

Sharpsville Boiler Works, Sharpsville, Pa., has authorized erection of one-story addition for production of pumping machinery, parts, etc., to cost about $70,000 with equipment.

Parts Engineering & Equipment Co., Pittsburgh, is being organized to take over and expand Parts Engineering Co., 1914 Liberty Avenue, manufacturer of automobile and machinery parts, and equipment. Walter R. Michel and J. F. Herron are incorporators of new company.

Keystone Driller Co., Beaver Falls, Pa., manufacturer of rock-drilling machinery, parts, pumps, etc., has arranged for an increase in capital from $2,000,000 to $2,500,000 for expansion.

General Aviation Corp., a subsidiary of General Motors, Inc., has purchased control of Pittsburgh Metal Airplane Co., with plant at Neville Island, Pittsburgh, subsidiary of Pittsburgh Aviation Industries Corp. Experiments with all-metal airplanes, developed by H. H. Franklin, will be continued by Metal Airplane company, and production is expected to get under way next fall.

National Tube Co., McKeesport, Pa., has purchased two 25-ton electric overhead cranes from Cleveland Crane & Engineering Co., and one 10-ton electric overhead crane from Harnischfeger Corp.

St. Louis

CONTRACT has been let by Continental Oil Co., Continental Oil Building, Denver, to Alco Products, Inc., Dunkirk, N. Y., recently formed subsidiary of American Locomotive Co., for new oil distilling plant at Ponca City, Okla., to cost over $100,000 with machinery.

Board of Education, Joplin, Mo., has authorized installation of manual training equipment in new two-story and basement high school, to cost $250,000 with equipment. Thomas W. Williamson & Co., Farmers' National Bank Building, Topeka, Kan., is architect. H. F. Cook, 733 Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Quix-Kold Corp., Oklahoma City, Okla., has authorized plans for a new dry ice-manufacturing plant at Fort Smith, Ark., to cost about $50,000 with equipment, work to begin early in April. Company has construction under way on similar plant at Norman, Okla., to cost about like sum.

City Council, Liberal, Mo., is considering a municipal electric light and power plant, to cost over $65,000 with equipment.

Keystone Mfg. Co., Kansas City, Mo., headed by A. W. Johnson, 513 Hall Building, is considering establishment of a new foundry for production of cast aluminum oil and gasoline receivers for automobiles, also other products, to cost close to $24,000 with equipment.

City Council, Erick, Okla., is planning installation of natural gas system to cost about $50,000. A special election has been called to authorize bonds in such amount.

Pawnee Indian Agency, Pawnee, Okla., is planning new power plant for central steam-heating service to cost about $25,000 with equipment.

Anderson-Prichard Oil Co., Colcord Building, Oklahoma City, Okla., has plans for a new gasoline refinery to cost about $85,000 with machinery.

Enid Milling Co., Enid, Okla., contemplates rebuilding part of grain elevator recently destroyed by fire, with loss over $40,000 including equipment.

City Council, Fairfax, Okla., is considering erection of a municipal electric light and power plant, to cost $320,000 with machinery. A special election is planned to approve bond issue in that amount.

Chicago

CONTRACT has been let by Peerless Enameling & Stamping Co., Belleville, Ill., to Bergmann & Lutz, 538 Second Street, for a one-story addition, 110 x 120 ft., to cost over $85,000 with equipment.

William F. Heise Mfg. Co., Chicago, has been organized with capital of $50,000 to take over and expand local company of same name with plant at 4516 Thomas Street, manufacturer of hardware, metal parts for automobiles, etc. William F. and Laigle G. Heise head new organization.

Twin City Machine Co., 39 Power Street, Minneapolis, has awarded general contract to Ernest M. Conley Co., 2322 Oakland Avenue, for new one-story machine shop, 60 x 120 ft., and one-story storage and distributing building, 50 x 80 ft., to cost over $10,000. Clyde W. Smith, Essex Building, is architect.

Interstate Seed & Grain Co., Fargo, N. D., has awarded general contract to T. E. Ibberson Co., Corn Exchange Building, Minneapolis, for new grain-cleaning and storage building to cost about $25,000. Installation to include screening, conveying and other equipment.

Northwestern Light & Power Co., Cedar Rapids, Iowa, will soon begin erection of addition to steam-operated electric power plant at Grundy Center, Iowa, to cost close to $60,000 with equipment. Company engineering department is in charge.

City Council, Dalton, S. D., will receive bids until March 21 for an elevated steel water tank and tower, capacity 200,000 gal., for municipal water system. O. A. Ricker is city engineer.

Hinchman, Acanion & Co., 30 North Dearborn Street, Chicago, manufacturers of power plant equipment, with electric and gas welding division, have leased 5000 sq. ft. in building of Ashland Industries Building Corp., 80-forty-fourth Street and Ashland Avenue, for expansion.

Ovens, power equipment, conveying machinery and other equipment will be installed in new plant to be erected by Nels P. Sorenson, 115 Kingsford Avenue, Waterloo, Iowa, to cost about $100,000 with equipment.

Fort Dodge Gas & Electric Co., Fort Dodge, Iowa, has superstructure under way for a two-story addition to steam-operated electric power plant, 35 x 75 ft., to cost about $200,000, of which about $135,000 will be expended for machinery. Company engineering department is in charge.

Board of Education, Brainerd, Minn., plans installation of manual training equipment in new two-story and basement junior high school to cost about $220,000, for which bids will be asked on general contract in 30 to 60 days. Croft & Boerner, 1004 Marquette Avenue, Minneapolis, Minn., are architects.

Neff, Kohlbusch & Bissell, Inc., machine tool dealer, Chicago, has moved from 806 West Washington Boulevard to 2400 West Madison Street.

Cleveland

PLANS are being considered by Standard Oil Co., East Ohio Gas Building, Cleveland, for new asphalt refining plant at Toledo, Ohio, to cost over $500,000 with machinery. Project will include boiler plant, machine shop and other units.

Town Council, Columbiana, Ohio, is considering an addition to municipal electric light and power plant, including installation of additional machinery.

Board of Education, Cleveland, contemplates installation of manual training equipment in connection with addition to Fowler junior high school, to cost about $350,000, for which plans will be prepared by George W. Hopkinson, Auditorium Garage Building, architect for board.

Argo Body Repair Co., Cleveland, care of Lawrence E. Appleton, Guarantee Title Building, attorney, recently organized by Sidney J. Arnold and Albert Paige, plans operation of local automobile body construction and repair works.

Ohio Edison Co., Akron, Ohio, has authorized a budget of $7,000,000 for extensions and improvements in properties in Akron, Youngstown and Springfield districts, of which over $1,300,000 will be used for a steel tower transmission line from generating plant at Toronto, Ohio, to Akron and vicinity. A new steam power plant, for central steam-heating service, is planned at Akron, to cost $200,000 with machinery. Other work will include power station improvements, line extensions, power substations, etc. Company engineering department will be in charge. L. G. Tighe is vice-president and manager of Akron district.

Board of Public Affairs, Berea, Ohio, is planning call for bids for extensions and improvements in municipal electric light and power plant, including installation of new equipment, to cost $55,000. Charles W. Root, Society for Savings Building, Cleveland, is engineer.

City Council, Akron, Ohio, is planning call for bids for a laboratory and research building for Guggenheim Aeronautical Research Institute at municipal airport, to cost about $100,000 with equipment. M. M. Konarski, Central High School, is architect. F. E. Swineford is city director, in charge.

New factory building to be erected by General Electric Co. in Cleveland will be one-story, 323 x 412 ft. with a two-story section, 50 x 323 ft. for general offices. In this plant will be made all wire filament for incandescent lamps and, in addition, all gases used in works of National Lamp Co. An argon department and oxide house will be located in separate units. A boiler house, 80 x 180 ft., will also be erected. Plant will be

built by Austin Co., Cleveland. Structural steel frame will be welded. New works will provide manufacturing space several times larger than present wire works at Hough Avenue and East Forty-fifth Street.

Otis Steel Co., Cleveland, has purchased one 50-ton, 87-ft. electric overhead crane from Morgan Engineering Co.

Superior Universal Products Co., has moved its plant from Bowling Green, Ohio, to Lima, Ohio.

Gulf States

PLANS are under way by Falls City Refining Co., Falls City, Tex., for a gasoline refinery near Henderson, Tex., to cost close to $100,000 with equipment and storage facilities.

Texas Public Service Co., San Angelo, Tex., which recently took over properties of Oklahoma Natural Gas Corp., has surveys under way for a new pipe line from Reagan County to San Angelo and for line to Rio Pecos, Tex., and vicinity, totaling about 120 miles, to cost over $1,000,000 with compressor stations and other structures.

Houston Salt Co., Esperson Building, Houston, Tex., is planning development of large salt deposit near Hockley, Tex., and will install temporary crushing and screening plant. Plans will be drawn for permanent structures, including a main multi-story mill, 100 x 100 ft., and storage and distributing unit, 100 x 200 ft., with installation of crushing plant at main shaft. A housing development for employees is planned. Project will cost over $160,000 with machinery.

Board of Trustees, Hope Haven Mechanical and Industrial School, Marrero, La., operated under direction of Roman Catholic Diocese, New Orleans, has received low bid on general contract from George J. Glover Co., Whitney Bank Building, New Orleans, for a two-story and basement mechanical arts building, 128 x 135 ft., to cost over $100,000 with equipment. A. S. Montz, 740 Poydras Street, New Orleans, is architect.

Cherokee Pipe Line Co., Dallas, Tex., recently organized by Thomas E. Crandell, 6255 Oram Street, and associates, is planning a pipe line for crude oil service from Joiner oilfields to point near Overton, Tex., to cost over $100,000 with pumping and other equipment. Same interests have formed Pilot Oil Co., to operate oil properties. M. S. Church, Linz Building, is interested in companies.

Dixie Gas & Fuel Co., Longview, Tex., is planning to rebuild gas plant at Kilgore, Tex., with installation of additional equipment, to cost $80,000.

Texas Rail Joint Co., Fort Worth, Tex., recently organized as a subsidiary of Illinois Rail Joint Co., Joliet, Ill., has awarded general contract to Quisle & Andrewes, 2212 West Seventh Street, for one-story plant units for fabricating works, forge shop and machine shop, to cost over $100,000 with equipment.

County Board of Education, Auburn, Ala., plans early erection of new two-story and basement school, 120 x 200 ft., with one-story vocational school unit adjoining, to cost about $175,000 with equipment. W. Y. Fleming, Opelika, Ala., is superintendent of County schools, in charge. Bids have been asked on general contract.

Independent Ice Co., Dallas, Tex., R. H. Giles, head, is planning new artificial ice-manufacturing plant at Longview, Tex., to cost $50,000 with machinery. Company is also planning two-story ice-manufacturing plant at Monroe, La., to cost about $100,000 with equipment.

Indiana

BIDS have been asked by Municipal Light and Power Department, Washington, for two-story addition, 16 x 115 ft., to municipal electric light and power plant, to cost over $80,000 with equipment. J. P. Adkins is manager.

Board of School Commissioners, Napanee, is considering installation of manual training equipment in new two-story and basement school to cost about $160,000, for which revised plans are being drawn by Hunkel & Henson, Connersville, architects.

Merger has been arranged between Advance-Rumely Corpn., La Porte, manufacturer of agricultural and farm implements and equipment, and Indiana Farm Machinery Co., same place, manufacturer of similar machinery, under first-noted name. Consolidated organization will have capital of $10,000,000 and 500,000 shares of common stock, no par value.

Department of Water, Evansville, plans erection of an elevated steel tank and tower with capacity of 100,000 gal., in connection with extensions and improvements in municipal waterworks to cost about $100,000. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

Board of Trustees, Purdue University, La Fayette, has secured 157 acres to be developed as airport in connection with aeronautical course of instruction, and plans erection of hangar with repair facilities and other field units.

National Battery Co., 501 N. W. Fourth Street, Evansville, manufacturer of electric storage batteries, with main plant at St. Paul, Minn., has taken bids for one-story service and repair building at Evansville, to cost $40,000 with equipment. Alfred E. Nowks, Old State Bank Building, Evansville, is architect. J. F. Frohliger is local manager.

Henry Langsenkamp, 1940 North Penn Avenue, Indianapolis, and associates have organized Dairies Equipment, Inc., with capital of 100 shares of stock, no par value, to operate a local shop for production of dairy machinery.

Pacific Coast

CONTRACT has been let by Atchison, Topeka & Santa Fe Railway Co., Kerckhoff Building, Los Angeles, to Villadsen Brothers, 417 Market Street, San Francisco, for one-story shop at locomotive repair works at Richmond, Cal., to cost over $45,000 with equipment. M. C. Blanchard, address noted, is company engineer.

City Council, Glendale, Cal., has authorized a fund of $121,000 for extensions and improvements in municipal electric light and power system, including additional equipment. City engineering department will be in charge.

Consumers Ice & Cold Storage Co., Fresno, Cal., has plans for an addition to car refrigerating and icing plant, to cost about $150,000 including equipment.

Johnston Tractor Co., Redlands, Cal., H. A. Johnston, president, manufacturer of farm tractors, etc., is planning new one-story plant for parts production and assembling, to cost over $40,000 with equipment.

Drew Canning Co., Ltd., San Jose, Cal., care of William F. James, San Jose, attorney, recently organized by F. M. Drew, Sunnyvale, Cal., and associates, is considering new fruit canning plant near San Jose, to cost close to $100,000 with machinery. L. J. Duffey, Niles, Cal., is interested in new organization.

Los Angeles Gas & Electric Corpn., Los Angeles, is arranging a budget of $1,000,000 for extensions and improvements in power plants and system, and gas properties, including additional equipment. Company engineering department is in charge.

Beaver Wood Products Co., Spalding Building, Portland, has engaged H. M. Bigler, Terminal Sales Building, engineer, to prepare plans for new plant, consisting of three one-story units, to occupy site, 50 x 300 ft., including main mill, 48 x 258 ft., to cost close to $75,000 with equipment.

Willamette Valley Lumber Co., Dallas, Ore., is planning an addition to electric light and power plant, and will install equipment to double present capacity, to cost $70,000. Eric Foighant is assistant plant manager, in charge.

Board of King County Commissioners, Seattle, has authorized Thomas Hunt, county engineer, to prepare plans for a new hangar, 100 x 200 ft., and 20-ft. lean-to, with repair and reconditioning facilities at Boeing Field, to cost about $50,000 with equipment.

Roberts-Lukins Warehouse Co., Odessa, Wash., Jack Roberts, head, is considering erection of new grain elevator with capacity of 50,000 bu., including electric conveying, screening and other equipment, to cost over $100,000. Lee Lukins, Colfax, is an official of company.

Board of Baker County Commissioners, Baker, Ore., Judge Charles E. Baird in charge, is considering purchase of a portable rock-crushing plant, portable mixer with capacity of 3½ cu. ft., and a portable air compressor, with capacity of 365 cu. ft. per min.

Canada

MUNICIPAL Council, Cap de la Madeleine, Que., is considering purchase of one centrifugal pump and 100-hp. motor. R. Morrissette is engineer.

City Council, Ottawa, Ont., contemplates purchase of two pumps for waterworks plant, for which bids will be called soon. A. F. Macallum is commissioner of works.

Canadian Rumely Co., 48 Abell Street, Toronto, has plans by its own staff for a $125,000 addition, for which tenders will be called in about 10 days. Superior Zinc Corpn., Philadelphia, will occupy premises on completion.

Nova Scotia Power Commission, Halifax, N. S., is contemplating expenditure of $350,000 on power development plant at Maccan, N. S. H. J. Johnston is engineer.

A machine shop, 50 x 240 ft., and a craneway building 25 x 85 ft., is under construction at Hamilton, Ont., for City Council. On completion equipment will be removed from old plant and some new machines will be purchased.

G. T. Clarkson, trustee of E. R. C. Clarkson & Sons, 15 Wellington Street West, Toronto, invites bids up to Feb. 26 on real estate, buildings, machinery, raw materials and finished goods of London

Foreign

New Trade Publications

Mining, Crushing, Smelting, Etc. Machinery.—Traylor Engineering & Mfg. Co., Allentown, Pa. Catalog 900 of 192 pages, including index, illustrating and describing a large general line of industrial machinery, including smelting accessories, copper converters, crushers and sizing mills, ferrosilicon machinery, rotary dryers, trommel screens, etc.

Feed Water Regulator.—Atlas Valve Co., 82 South Street, Newark, N. J. A 16-page booklet giving a detailed description of the Cumpelik feed water regulator. This new "Plate and Price Book" shows in detail how the regulator is installed to suit various conditions. A complete list of parts with prices is included and also a complete list of control valves of various designs.

Turbine-Generator Units.—Westinghouse Electric & Mfg. Co., East Pittsburgh. Circular 1835-A, dealing with company's 3600-r.p.m. steam turbine-generator units. Many illustrations showing design and construction of all parts are included.

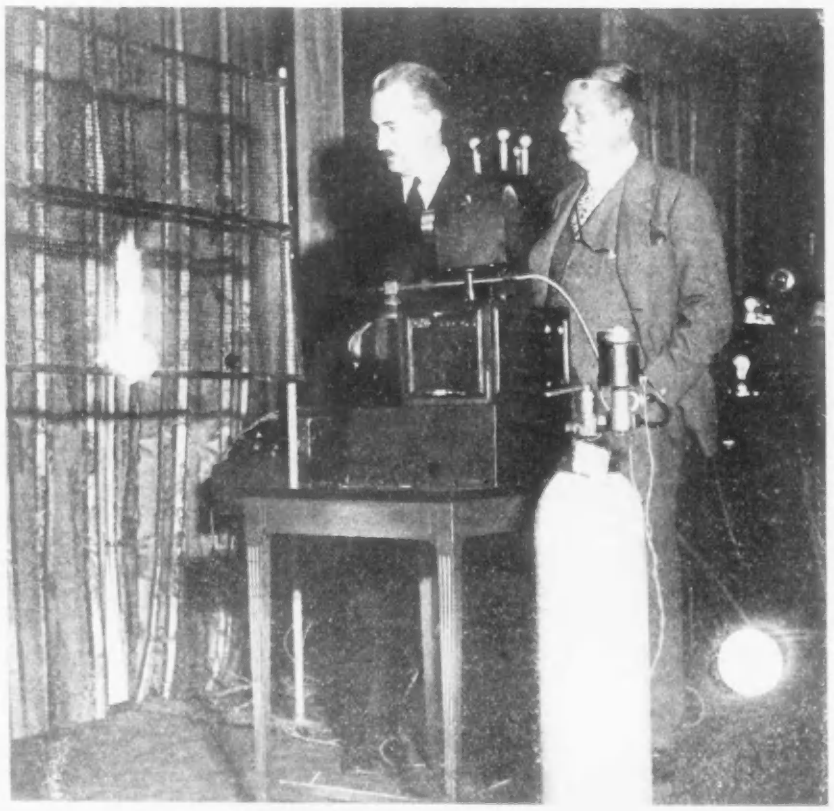
Precision Ball Bearings.—New Departure Hoffmann Bearings Corpn., Bristol, Conn. Booklet of seven pages illustrating and describing the "Greaseless" closed type precision ball bearings. Tables of sizes and dimensions and other data are given.

Conveyor Ovens.—Despatch Oven Co., Minneapolis. Bulletin 12, of four pages, featuring elevated and tunnel type conveyor ovens, for use in various baking and drying processes. Illustrations show installations.

Slip-Ring Motors.—Wagner Electric Corpn., St. Louis. Eight-page bulletin discussing mechanical and electrical characteristics of slip-ring motors, their ability to start smoothly under heavy load, their speed-torque characteristics and the control equipment necessary.

Electric Fans.—Wagner Electric Corpn., St. Louis. Bulletin No. 163 illustrates and describes new fans added to the Wagner line. Two non-oscillating fans 8 and 10-in. and a one-speed 10-in. oscillating fan are included, as well as two new ceiling fans 26 and 52-in.

Condensate Pumps.—Westinghouse Electric & Mfg. Co., East Pittsburgh. Leaflets L-20128 and L-20147, concerned with both motor-driven and turbine-driven condensate pumps. The first leaflet deals with the single-stage, and the second with the two-stage pump, and both contain characteristic curves showing the capacity of the pumps.



"ELECTRIC EYE" PUTS OUT FIRE

USE of the photo-electric tube, or the "electric eye," as it has often been called, for extinguishing fire was recently demonstrated in New York by Dr. Phillips Thomas, research engineer of the Westinghouse Electric & Mfg. Co., East Pittsburgh. The camera-like hood in the illustration encloses a photo-electric tube. Small blazes were started by Dr. Thomas, and, as the light beams from these fires reach the electric tube, the latter releases a stream of extinguishing fluid.

European Unemployment Increases as More Mills Curtail Output

(By Cable)

LONDON, ENGLAND, Feb. 16.

THE general business situation is causing apprehension on the Continent, although some industrial leaders believe that recovery cannot be long delayed, as world consumers' stocks are undoubtedly low and export prices are well below cost. In Germany, the Duisburg-Meiderich steel works will probably close soon. Other mills are faced with additional curtailment, and the unemployed list is expected to increase by many thousands in a few weeks.

The tone of the tin plate market is better, as inquiry is expanding. Business, however, is still small. Unfilled orders on mill books are now nearly double the tonnage at the end of October, which was the lowest of the year. Prices, consequently, are steadier, with fewer prominent cheap sellers. Galvanized and black sheets are quiet and many mills are still idle.

The British Mannesmann Tube Co. is closing its Landore plant at the end of February, as a result of an arbitration award.

Pig iron is quiet, but the current Cleveland output is fully absorbed, and stocks are diminishing. Middlesbrough furnaces have sold 2000 tons of ferromanganese to the United States and small lots of hematite to Italy. Otherwise the general situation is unchanged. British steel is very dull, as new shipbuilding is virtually stopped, and steel plants are operating only part time. Export sales are small.

With more mills forced to curtail operations, Continental producers are becoming apprehensive at the increase in unemployment.

* * *

Machine tools and agricultural machinery at Leipzig Spring Fair is 15 to 20 per cent cheaper than year ago.

* * *

German steel plant which is closing failed to obtain union consent to 20 per cent wage reduction.

* * *

Japan's total steel imports in 1930 were less than half of those of 1929.

The United Kingdom exported 17,300 tons of pig iron in January, of which the United States was sent 200 tons. Total iron and steel exports were 167,000 tons.

German exports in 1930 decreased 1,000,000 tons to a total of 4,800,000 tons.

Continental markets are dull, with an easier price tendency in certain directions. British users of semi-finished steel are specifying more freely, but new business is slow to develop.

Belgian output in December was 270,000 tons of pig iron, making the total for the year 3,293,000 tons. Raw steel output was 265,000 tons, bringing the year's total to 3,286,000 tons.

French production in December was 800,000 tons of pig iron, and for the year 10,400,000 tons, with steel output at 756,000 tons in December and 9,425,000 tons for the year.

Russian output in January was 295,000 tons of pig iron, 306,000 tons of raw steel and 233,000 tons of rolled steel product.

Japan's Steel Imports Greatly Reduced

YOKOHAMA, JAPAN, Jan. 17. Importation of iron and steel showed a further decline in total tonnage for 1930, even steel scrap from abroad having been off 7356 metric tons from 1929, as a result of curtailed operations at Japanese steel plants. The total scrap arrivals for the year were 489,698 tons, and of all rolled steel products, 428,709 tons, a decrease from 1929 of 348,660 tons. Pig iron receipts from abroad were reduced 248,227 tons to a total of 405,828 tons in 1930.

The greatest decline in a single product was in wire rod imports, which totaled 67,663 tons for 1930, a

British and Continental European Export Prices per gross ton, f. o. b. United Kingdom Ports, Hamburg and Antwerp with the £ at $4.8665 (par)

British Prices, f. o. b. United Kingdom Ports

Ferromanganese, export	£9	0s.	to	£11	5s	$43.74	to	$54.75
Billets, open-hearth	5	7½	to	5	10	26.12	to	26.76
Black sheets, Japanese specifications	11	10				55.95		
Tin plate, per base box	0	15½	to	0	15¾	3.77	to	3.80
						Cents a Lb.		
Steel bars, open-hearth	7	15	to	8	5	1.69	to	1.79
Beams, open-hearth	7	7½	to	7	17½	1.60	to	1.71
Channels, open-hearth	7	12½	to	8	12½	1.66	to	1.87
Angles, open-hearth	7	7½	to	7	17½	1.60	to	1.71
Black sheets, No. 24 gage	8	10				1.84		
Galvanized sheets, No. 24 gage	11	0				2.42		

Continental Prices, f. o. b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2	19s.	to	£2	12s.	$12.15	to	$12.64
Billets, Thomas (nominal)	£3	18s.	to	£3	11s.	$17.01	to	$17.25
Wire rods, low C, No. 5 B.W.G.	5	2½	to	5	7½	24.94	to	26.15
Rails, light	6	0				29.20		
Black sheets, No. 31 gage, Japanese	11	5	to	12	12	54.68	to	58.32
						Cents a Lb.		
Steel bars, merchant	4	0	to	4	2	0.87	to	0.88
Beams, Thomas, British standard (nominal)	3	14	to	3	12	0.79	to	0.80
Channels, Thomas, American sections	5	12	to	5	14	1.24	to	1.26
Angles, Thomas, 4-in. and larger, over ¾-in. thick	3	19	to	4	0	0.85	to	0.86
Angles, Thomas, 3-in.	4	1	to	4	3	0.87	to	0.89
Hoop and strip steel over 6-in. base	4	10	to	4	11	0.96	to	0.97
Wire, plain, No. 8 gage	5	12½	to	5	15	1.24	to	1.27
Wire, barbed, 4-pt. No. 12 B.W.G.	9	7½	to	9	10	2.08	to	2.09
Wire nails, base	6	17½	to	6	0	$1.39	to	$1.39
						0.806		

reduction of 89,615 tons from the 1929 total. Another important reduction was in steel plates, 67 mm. and thinner, total arrivals of which were 27,4[illegible] tons in 1930, a decline of 52,388 tons from 1929. Pipe and tube imports declined 24,848 tons to 28,201 tons in 1930.

The decline of iron and steel arrivals in 1930 is attributed partly to reduced requirements as a result of depressed business and also to successful efforts to establish a large domestic steel production.

Japanese Steel Mill Has Year's Scrap Supply

YOKOHAMA, JAPAN, Jan. 17.—The Seitetsu-sho Government Steel Works does not expect to buy steel scrap during the next fiscal year. Consumption of scrap has been greatly reduced by curtailed operations, and the company has about 100,000 tons of scrap in stock. It is planned to consume this stock in addition to about 150,000 tons of scrap annually produced in the company's operations.

German Steel Industry Is Maintaining Efficiency

HAMBURG, GERMANY, Feb. 4.—Dr. Krupp von Bohlen und Halbach, president, Friedrich Krupp A.-G., Essen, recently said that, despite the present depressed conditions of business and the heavy burdens imposed on the German steel industry by social charges, every effort is being made to maintain the mills at high efficiency and keep pace with scientific improvements in production methods.

Closed Steel Mill Sought 20 Per Cent Wage Cut

DUSSELDORF, GERMANY, Feb. 2.—The Hütte Ruhrort Meiderich, subsidiary of the Vereinigte Stahlwerke, A. G., which recently suspended, dismissing 7000 workmen, did so because of the refusal of labor unions to accept a total wage reduction of about 24 per cent. The company had offered to guarantee continued operation of the blast furnaces and steel plant until next October with a force of 4500 workmen, provided a reduction of 20 per cent in wages was accepted. Most of the executives and other workers in the steel industry have accepted reductions of 10 to 15 per cent in their salaries and bonus payments.

Machinery at Leipzig Is Cheaper Than Year Ago

HAMBURG, GERMANY, Feb. 4.—A recent estimate of prices on machines to be exhibited at the Leipzig Spring Fair, March 1 to 10, places them at 15 to 20 per cent under the charges for the same machines exhibited at Leipzig a year ago. The reduction is most marked in machine tools and agricultural machinery and minor in mining and textile machinery.

Russia Buys Steel in Germany

HAMBURG, GERMANY, Feb. 4.—The Soviet Union has recently placed some substantial tonnages of steel with German mills, including 7000 tons of heavy plates with the Borsig A. G., in Silesia, and 8000 tons of structural shapes and forgings with the Vereinigte Oberschlesische Hüttenwerke.

Martin Automobile in Limited Production

Limited production of Martin cars at the plant of the Moller Mfg. Co., Hagerstown, Md., has begun, according to J. W. Bryan, president, Martin Motors, Inc. It is expected to display two passenger cars and a commercial truck the first week of March at some of the 1500 agencies which the company says it has selected.

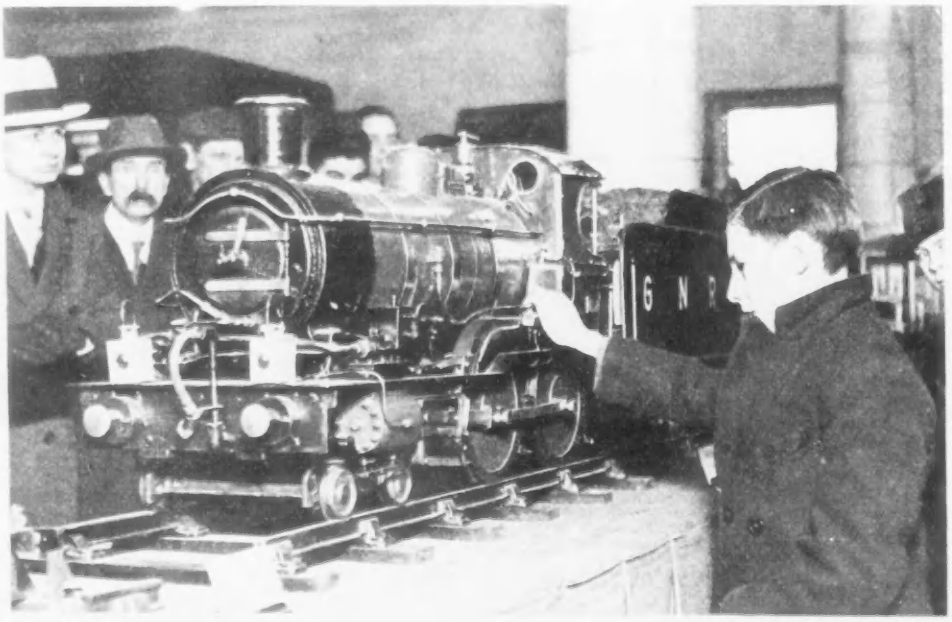
The cars will be known as the Victory Line of Martin Motors, Inc. The first to be on public display will be a standard coupe, to be sold at $2[illegible] f.o.b. Hagerstown; the deluxe convertible coupe, to be sold at $350, f.o.b. Hagerstown, and a quarter-ton truck with 34 cu. ft. carrying capacity. The exact price of the truck has not been determined, but it will be less than $400.

Output in the first week of March is expected to reach 100. The company is tooling its plant and expects to reach full production of approximately 300 cars a week about Aug. 1.

A. S. M. E. Plans European Tour

The official European tour of the American Society of Mechanical Engineers will include visits to large industrial centers, as well as to centers of art and scenic interest. Attendance at the seventy-fifth anniversary meeting of the Verein Deutscher Ingenieure, to be held at Cologne, June 26-29, is included in the itinerary; in many of the cities visited there will be receptions by other engineering societies and city administrations.

The party will sail from New York on June 13 and return on Aug. 5. More than 150 tentative applications have been made.



MODEL LOCOMOTIVE MADE FROM SCRAP

AT the Underground Railway Exhibition in London, a model locomotive made entirely from scrapped parts aroused great interest. The locomotive was made by a guard employed by the London subways.

Decline May Have Ended

Prof. Charles Bullock Believes January Upturn May Mark Beginning of Recovery

THE business depression may already have come to an end, in the opinion of Charles J. Bullock, professor of economics, Harvard University, and president of the Harvard Economic Society, who addressed a large gathering recently at the United Engineering Societies Building, 29 West Thirty-ninth Street, New York.

Professor Bullock qualified this statement, however, by saying that it is a little too early to state definitely that the upturn has come, considering that only one month's figures denoting improvement are at hand. He thought, however, that a somewhat favorable conclusion could be drawn from the fact that various indices for January, such as bank debits, construction contracts, manufacturing, including pig iron and steel production, have either expanded or have been horizontal during the first month of 1931, and even a horizontal line he regarded as a favorable indication of an end of the decline.

For the immediate future, he predicted a gradual improvement all along the line and not spectacular in any particular industry.

Reviews Past Depressions

Comparing the present depression with those of the past, he commented on the fact that, with the exception of the depression of 1873, which lasted for about five years, no depression has extended longer than 18 to 20 months, and if history repeats itself the present depression should end some time in the present quarter. Professor Bullock drew a comparison between the depression of 1921 and the present one, saying that we were able in 1921 to put our house in order and in 1922 were well on the road to recovery.

He was inclined to the opinion that 1930 might be likened to 1921 and that 1931 will be a year of gradual but steady improvement, as was 1922. In 1922, however, there was a building shortage and a large expansion in the automobile industry, both of which were primary factors in the recovery at that time. He believed that no single industry would exert so strong an influence upon recovery this year as did the building and automobile industries in 1922, and this brought forth his comment that the recovery was more likely to come from a large number of sources rather than from a few.

Professor Bullock was also of the opinion that the United States will lead the way in world recovery and that it must recover by its own efforts and cannot depend to any large extent on other nations. Reviewing world-wide conditions, he thought that the situation in Europe may get worse before it gets better and that the low point in some of the European countries may not be reached before summer. He brought out, however, that the European situation today is better than it was in 1921, and at that time the United States managed to recover from depression without the help of Europe. "If we did it then," he said, "we ought to be able to do it now."

He dwelt at length on the silver situation, on gold movements and other economic factors which have contributed to make the present depression wider and deeper than some that have occurred in the past.

Meeting of Testing Society's New York Members

The executive committee of the American Society for Testing Materials has organized a committee of the society's members living in the New York district, and, as a result, it is planned to hold a meeting of such members on Thursday evening, March 5, in the north ballroom of the Hotel New Yorker.

The general subject will be the limitation of present knowledge of non-ferrous metals, cement, concrete and electrical materials. There will be a presentation of recent and prospective developments in these fields.

It is expected that J. A. Capp, General Electric Co., Schenectady, N. Y., and also past-president of the society, will speak on electrical materials and that Dr. Paul D. Merica, of the International Nickel Co., will present the subject of non-ferrous metals.

Metal Merchants Hold Annual Dinner

The seventh annual dinner of the Metal Merchants' Credit Association of New York was held Feb. 5 at the Hotel Astor. Eighty-six persons, members and guests, attended. Among the steel companies represented were the Youngstown Sheet & Tube Co., Youngstown; Wheeling Steel Corpn., Wheeling, W. Va.; Republic Steel Corpn., Youngstown; Jones & Laughlin Steel Corpn., Pittsburgh; Apollo Steel Co., Apollo, Pa.; Sharon Steel Hoop Co., Sharon, Pa.; Bethlehem Steel Co., Bethlehem, Pa., and the Continental Steel Corpn., Kokomo, Ind.

Officers of the association for 1931 are Ernest H. Katz, Bayonne Steel Co., Long Island City, chairman; Louis Cohn, Schwartz & Cohn, Inc., Brooklyn, treasurer, and Franklin E. Devlin, secretary. J. George Fuchs of Bruce & Cook, Inc., New York, is chairman of the sheet steel division, Mandel Levy of the West Side Supply Co., New York, chairman of the roofings division, and Thomas M. Bohen, Whitehead Metal Products Co., New York, chairman of the copper division.

New Research Project at Battelle Institute

The trustees of Battelle Memorial Institute, Columbus, Ohio, announce the establishment at the institute of a research project sponsored by the Calumet & Hecla Consolidated Copper Co., Calumet, Mich. The purpose is to make a fundamental study of arsenical and argentiferous Lake copper in respect to its properties and application to industrial uses.

It has long been recognized that copper containing small amounts of arsenic and silver has definite well-defined advantages, and recent developments have forcibly brought to mind the possibilities of further industrial applications. This research program is comprehensive in character and is in a promising and fertile field.

G. L. Craig has been added to the institute staff for work on this project, which is under the direct supervision of Dr. H. W. Russell and J. L. Gregg. Mr. Craig was formerly research fellow with the United States Bureau of Mines and more recently metallurgist for the Fairmount Aluminum Co.

Blast Furnace Men Meet at Pittsburgh

Banking of furnaces, beneficiation of ores, low wind and the effects of silicates upon the quality of pig iron were the principal topics discussed at the winter meeting of the Eastern States Blast Furnace and Coke Oven Association, held at the William Penn Hotel, Pittsburgh, on Feb. 13. At the afternoon session, Ralph H. Sweetser, consulting engineer, Columbus, Ohio, delivered a paper on "The Necessity for Uniformity of Quality in Coking Coal," while A. J. Boynton, vice-president, H. A. Brassert & Co., Chicago, spoke on "Russia's Five-Year Plan." Mr. Boynton's observations were first-hand, he having spent some time studying conditions in that country.

I. Lamont Hughes, president, Carnegie Steel Co., Pittsburgh, spoke at the dinner meeting, and was followed by the exhibition of a motion picture, "Plant Life," under the auspices of the Koppers Co., Pittsburgh.

Business as Others See It

Digest of Current Financial and Economic Opinion

LITTLE of a definite nature appears in the reviews and observations this week. "Moderately encouraging" is one estimate of the situation. Another writer sees "no vigorous recovery yet." That things are "a little more lively" is a third view, while others clothe the situation with favorable aspects or refer to the "cautious advance" under way.

That we are on the bottom and perhaps well on the way to the beginning of the climb up the farther slope is a view shared by many, but hard to establish statistically. This is a point made by Harvard Economic Society, among others. "The indicators which have most regularly signaled recovery from past depressions are now either positively favorable, in that they have already advanced, or at least negatively favorable," through no longer declining, says that society.

Shrinkage in Inventories of Consumers' Goods

Further, that organization finds that commodity stocks, while still excessive in many raw materials, are considerably short of a year ago in most of the manufactured items. And the measure is quantity—not dollars. Where the dollar is the only adequate measuring stick, as in department store stocks, the shrinkage has been greater than the decline in average prices would, alone, have brought.

Current figures represent past performance, points out *Commerce and Finance*, in support of its optimism that we are "around the corner." What is now being published "reflects conditions as they were a month or more ago. It will take about 30 days more to gather and publish the indicia of what is now taking place."

Colonel Ayres places the increase during January of the number of blast furnaces in operation in the forefront of predictive items. "Always in periods of major business depression," he says, "the first important increase in blast furnace activity has indicated that the bottom of the depression has been reached."

Nevertheless, he does not anticipate that we are to "start at once upon a vigorous and sustained recovery. . . . The history of previous depressions would indicate that business activity is more likely to remain near these low levels for some months." But the upturn in furnace operations does "constitute almost the first real evidence we have had that the long decline of business is probably at an end—and that is encouraging."

A week ago *Annalist* referred to the "January hesitation," indicated in reduced figures for power output and other current measures of industrial activity. Reference was then made to the "cautious attitude of business men, which contrasts so strongly with the misplaced optimism of a year ago." While this is a prudent policy, "it does not contribute strikingly to increase in factory employment and, through that, to stimulation of business," says that commentator.

Several things are mentioned by Alexander Hamilton Institute as having "contributed to cheerful sentiment." Increase in steel unfilled orders, gain in steel mill activity, upturn in ingot production and in automobiles, gains in car loadings and in retail sales and the rise in the stock market—all are cited.

Traces it All to the War

An address by the president of First National Bank, Chicago, carries the genesis of the current depression back to 1914 and the World War then begun. "When peace came war demands were gone; peoples were impoverished, purchasing power was destroyed. But the war-time capacity for production was at its peak and was easily convertible to supplying unsalable volumes of peace-time commodities."

After the 1920-1921 collapse came the attempted rehabilitation of business through credit, with colossal inflation in security issues and in speculation, and consumer credit expanded by instalment selling. "In 1929 we had absorbed not only our own available liquid resources but about three billions of that of the rest of the world. The inevitable crash," he concludes, "should not have taken anyone unawares."

Does Mass Production Tend to Minimize Profits?

(Concluded from page 608)

industrial progress, the collective action of many managers in many industries has resulted in a capacity to produce much in excess of the present consuming capacity of our country.

Continuous production is only possible in the presence of continuous demand. Demand may be kept elastic by lower prices made possible by continuous manufacturing efficiency. It is a paradox that the volume producer in a stable industry can no longer continue to look to volume to reduce costs and have steady and continuous profits. He must now reduce his costs by improving methods within his plant. And when business is slack he may take advantage to make changes and improvements in his product and, with the benefit of lower prices elsewhere, he may lower his own prices to a level which will keep the flow of orders uninterrupted. Then regular output means profits. And after a period of rapid expansion of sales, instead of reckless additions to increase production, let him seek to maintain consumption at the higher level and develop profits which will enable him to repeat the cycle, each time seeking not a larger market, but a more certain market for more goods.

Effect of Cold Work on Beryllium Bronzes

It is known that, by cold working, the various intermetallic changes occurring in the solid metal, including the aging phenomena, are accelerated, said Dr. E. Schell in a paper before the annual meeting of the Deutsche Gesellschaft für Metallkunde (German Institute of Metals), Nov. 8 to 11. The title of this paper was "Influence of cold working on the change in Conductivity Induced by Aging of Beryllium Bronzes." However, the change in conductivity of beryllium bronze exhibits abnormalities which have also been observed by Professor Fraenkel in some agable aluminum alloys. It appears, therefore, that this phenomenon is connected with a preliminary reduction of the conductivity during aging.

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"OF COURSE, I READ THE ADVERTISING"

THE owner of a manufacturing plant, who recently subscribed for The Iron Age, told us that a factor of no little importance in influencing his decision was "the fine selection of advertisements you publish," to use his own words.

An investigation conducted some years ago by an advertising agency revealed that the great majority of Iron Age subscribers read the advertising pages regularly. Not a few said,

"I find the information in the advertising pages of equal value to that in the editorial pages."

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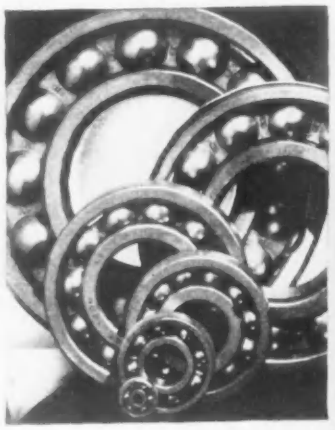
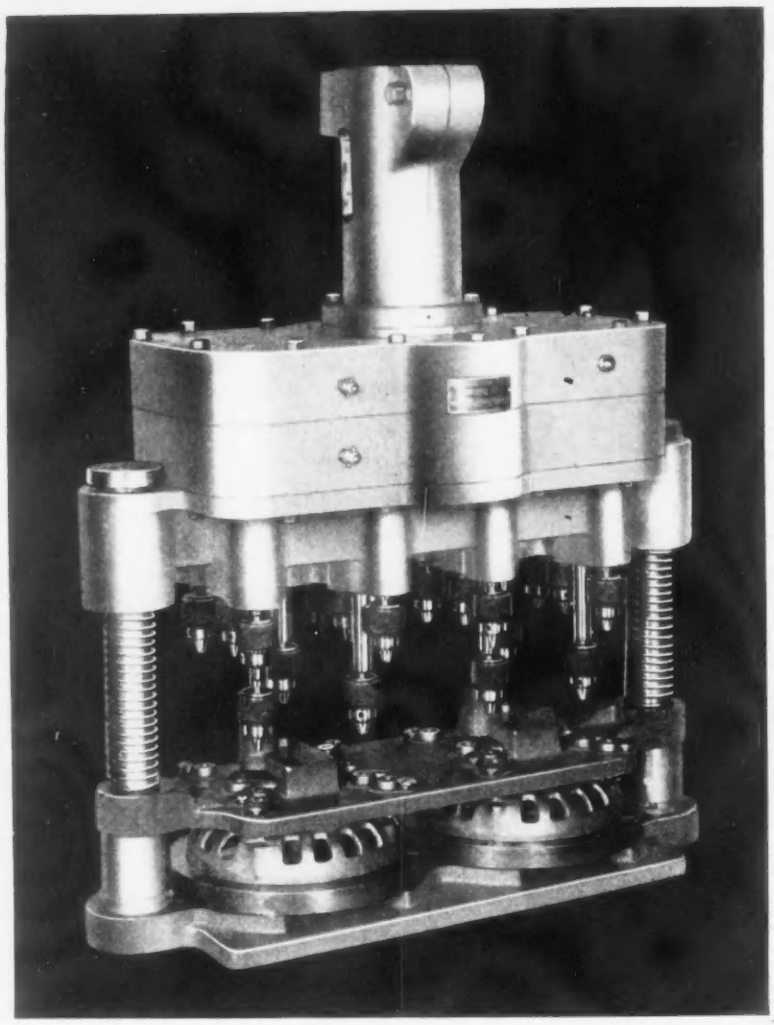
NEW DEPARTURE BALL BEARINGS





Holes . . at Wholesale Prices

Problem — to drill many holes as economically as possible in motor end-bell castings.

Answer — New Departure-equipped drill heads. In the case illustrated two of them are mounted on an indexing table so that one works while the other is being loaded. Eighteen finished holes at every trip of the pedal. 65 New Departure Ball Bearings are used in every head, for spindle accuracy and rigidity . . . for gear alignment and long life . . . for effective lubrication at any speed. When you buy machines equipped with New Departures you can push them to the limit. These ball bearings are built for work. The New Departure Mfg. Company, Bristol, Connecticut; Detroit, Chicago, San Francisco.

Head shown is built by United States Drill Head Company, Cincinnati.

THIS ISSUE IN BRIEF

FEBRUARY 26, 1931

NEXT WEEK

YOU can lead a horse to water but you cannot make him drink. Reduced demand for consumer goods is due not alone to curtailed purchasing power, but is accounted for in part by diminished inclination to buy. The public has been sated with many products. It needs the stimulation of innovations, which have a way of bringing out purchases regardless of the state of general business.

Undoubtedly the appeal of new things will provide much of the impetus that will pull us out of the current slump in business. How one of the newer consumer goods has been forging ahead regardless of the depression will be told in the next issue.

"Animosity Surpluses" Are Absent

Labor knows that employers are doing all they can to mitigate conditions by maintaining wages and providing jobs where possible. The change from the old-time hard-boiled treatment of labor in depressions is marked.—Page 679.

* * *

Employment Trend Is Spotty

Survey of the metal-working industries in 24 industrial centers reveals an employment gain in 10, and either a loss or no gain in 14.—Page 680.

* * *

"Fifty-fifty" Pension Plans Are Popular

Since 1926 the trend toward contributory pension plans has been marked. Both employer and employee contribute to the pension cost. The number of formal pension plans in operation is estimated at 450, and the coverage of employees at four million.—Page 686.

* * *

Thin-walled Aluminum Alloy Castings

Silumin's casting properties permit use of thinner-walled pieces. It is popular in Europe as a means of decreasing dead weight of textile machinery parts.—Page 689.

* * *

Haphazard vs. Scheduled Maintenance

Even small plants will find that it pays to schedule maintenance ahead on a control board, showing when work is to be done, estimated cost, who will do it, and how much time is available for the work.—Page 691.

* * *

Question Interpretation of Elongation Test

Elongation, reduction of area and ultimate strength are not trustworthy indications of the probable behavior of a metal under stress, German investigator maintains. Hardness and yield point determine resistance to alternating stress.—Page 693.

* * *

Insures Cost Accuracy

Variable budgeting method checks costs directly as they accrue. If an item is charged to overhead which should have gone into direct labor costs, the fact is established.—Page 700.

Sales Peaks No Bar to Production Regularity

Eastman Kodak's sales curve has sharp peaks and valleys. Yet the most economical production level is maintained throughout the year, with consequent stabilization of employment, by annual sales forecast coupled with close production control.—Page 697.

* * *

A Budget That Varies with Operating Rate

Budget is scheduled for different operating rates. When operating rate goes up, the budget allowance is automatically increased. Of course, this does not apply to fixed charges, such as rentals and insurance.—Page 698.

* * *

Lightens Die Set Castings

Though cupola iron is commonly used, air furnace iron or cupola iron refined in an electric furnace have given excellent results. Decrease of the cross-sections has yielded substantial savings.—Page 702.

* * *

To Eliminate Warpage

When quenching leader pins excessive warpage will be eliminated by keeping them in a perfectly straight position. Bushings are best quenched individually.—Page 705.

* * *

Heat-Treating Increases Weld Strength

Tests made on single butt joints in aircraft construction show an increase in strength due to heat treatment from about 80,000 lb. per sq. in., unheat-treated, to 140,000-175,000 lb. per sq. in., heat-treated.—Page 710.

* * *

How Tough Is It?

Reasonably low shearing strength in comparison with cohesive strength is a measure of toughness.—Page 694.

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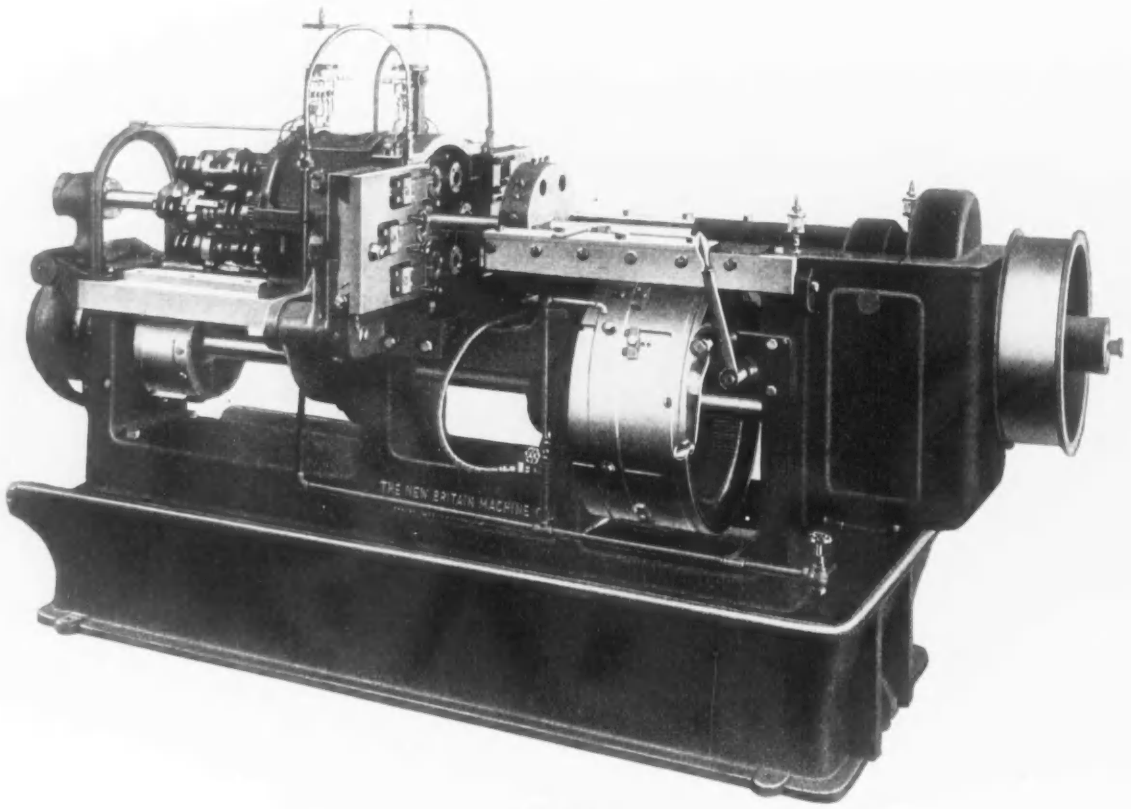
Man-Hours Are True Industrial Gage

Decline in man-hours in one State was nearly twice as sharp as that in the number of employees. Employment volume, therefore, is not as accurate as man-hours in measuring industrial activity.—Page 698.



NEW BRITAIN GRIDLEY NBG AUTOMATIC MACHINERY

New Britain Sextuple Bar Machines

Simple cutting off operations, either alone or in conjunction with drilling are required for the efficient manufacture of many articles such as rolls, pipe couplings, studs, piston rings, etc. The total cost of manufacture of these articles is dependent to a considerable extent upon the cost of the cutting off or blanking operation.

New Britain Sextuple Bar Machines cut off, or cut off and perform other operations, in six positions simultaneously. Production is therefore six times that possible from a single spindle machine. Blanking cost and hence the total cost per piece is lowered through use of these machines.

Available in two sizes: 1" and 1¼" stock capacities.

Both are equipped with anti-friction spindle bearings.

THE NEW BRITAIN-GRIDLEY MACHINE CO.
NEW BRITAIN, CONN.
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